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Elevated Railway for Broadway.

The inventor of this railway, Mr P. Andrew, of Cincinnati, Ohio, has kept three things constantly in view, which he claims, as follows:—First, a light superstructure; second, one that would occupy the least space; third, a capacity for carrying passengers adequate to the requirements of Broadway.

A single row of pillars, A, support four tracks—the two upper tracks form a distinct roadway, the two lower ones another—each having an up and a down track. The pillars are placed on the outer edge of the sidewalk, in range with the line of curb-stones, having sills cast upon them that extend the length of the arms that sustain the tracks, and in the same direction; these are bolted upon heavy blocks of stone, B, that are placed beneath the sidewalk extending under the street. As will be seen in the engraving, the pendent parts, C, of the arms have projections for the outer rails of the lower tracks, the inside rails are supported from projections from the pillars; upon these projections are placed the chairs upon which the rails rest and are fastened. The chairs for the upper rails are placed upon the upper edge of the arms. The rails are supported by truss rods, D, the ends of the rods being screwed or fastened into the chains.

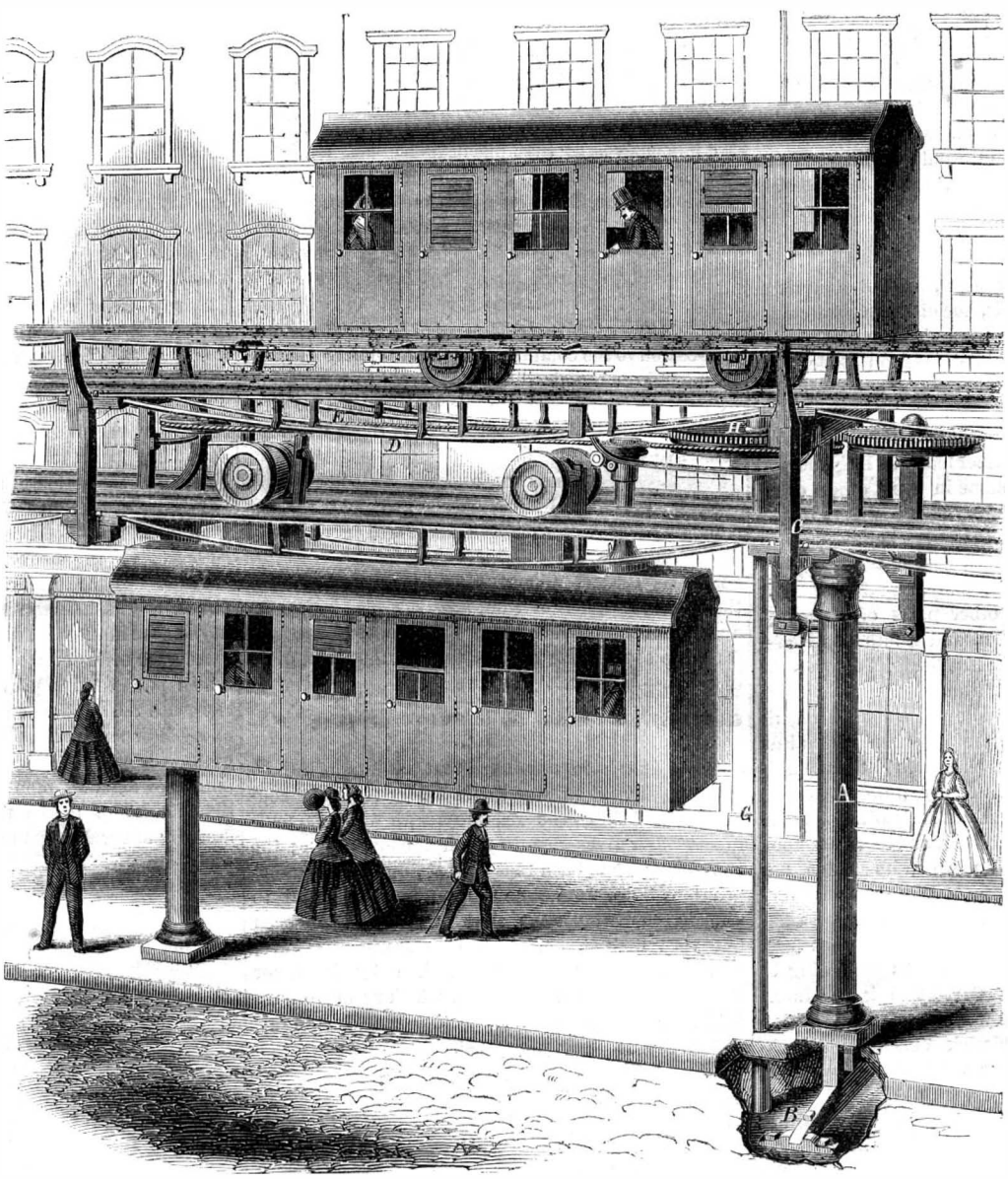
For the purpose of reducing the car to the smallest space, it is made the width of a seat for two persons, the seat being placed across the car, and doors on the sides of the car for each seat, thus affording easy facility for egress and ingress. The lower cars are suspended from the lower tracks, the wheels being attached to the top of the car; the upper cars run upon the rails as upon other railways. All the cars are propelled by a succession of endless ropes, E, which are sustained at intervals by grooved wheels, F, that are fastened to the lower edge of the arm. The ropes will run the distance of two squares, or a greater distance, if found practicable.

The engines for propelling the ropes are placed under the sidewalk or in the cellars, putting in motion a vertical shaft, G, to which the rope-propelling machinery is attached; this machinery is simple, being two spur wheels, H, above two grooved ones that grasp the rope, so arranged by levers that the grooved wheels tighten upon the rope in proportion to the weight drawn. Each engine will propel two ropes; if the ropes extend 800 feet, the engines will be placed four squares apart.

The machinery for attaching the car to the rope is also simple, and so arranged as to prevent any shock at the starting of the car; the rope is permitted to slip until the car has attained the momentum of the rope. When started the car will proceed to the end of the railway without stopping or requiring the attention of any one, acting automatically—releasing its hold upon one rope, seizing the next in succession unless it is stopped at the stations, being entirely under the control of the person who attends to the stopping and starting of the cars. It is proposed, instead of sending conductors with the cars, to have two persons at each station—one to stop and start the cars, the other to receive tickets; if it is found necessary a conductor may be sent with each car, who can stop or start it at pleasure by pulling or releasing a cord pendent from the top of the car.

Such is the construction of the railway that the cars cannot be run off the tracks; they are removed from one track to the other, at the ends of the road, by a sliding table, and in the same way may be removed at intermediate points, from track to track, or taken from the tracks, when necessary, and placed in depots.

The streets are crossed by suspending the frames that support the tracks in the manner of a suspension bridge. Should it be deemed preferable the whole railway can be built in this way, and present a light and beautiful appearance; but should it be built supported by pillars, except at the crossing of the streets—as shown in the engraving—it would be, if properly and tastefully constructed, ornamental instead of unsightly, occupying but little space and in no way obstructing the light or darkening the lower stories of the houses.



ANDREW'S ELEVATED RAILROAD.

Those who are desirous of relieving Broadway, and are seeking some means of doing so, should not fail to see the model now in a room of the New York Association for the Advancement of Science and Art, in the Cooper Institute, in care of Dr. L. D. Gale, general secretary of the Association.

Wire Rigging.

We see it stated in one of our cotemporaries—arguing the advantage of wire rigging for ships, and showing the extent to which it is used in Europe—that we have no similar employment for the same article in this country, and that it is not manufactured here. This is a mistake. Wire has not replaced rope so largely in the rigging of our merchant and naval marine as in Europe, because hemp has been cheaper here than it is there, and because economy has not been so much studied by us as by foreign nations. It is, however, coming into greater use, and ships may be found along our wharves and piers almost daily which are supplied with wire rather than rope rigging. As every day sees the increase of the change, it is reasonable to presume that soon we shall be as well supplied as Europe is in this respect.

There is at least one establishment in this State devoted to the manufacture of wire rigging, and one has long been in operation in New Jersey. Both are partially deprived of business now by reason of the war, or rather have been, for business of all kinds is growing, and in the aggregate that of shipbuilding, and consequently the employment of rigging. It is manufactured of all sizes, from sash cords to wire two inches in diameter, and, of course, has an unequaled strength and durability. Beside its chief application, to the rigging of ships, it is employed in warehouses, mines and quarries, for guys to derricks and cranes, and for various other purposes.

We are gratified to see that the manufacture, which for many reasons is growing and important, has been domesticated with us, and hope there may be that success attending it which has been reached in England, and, to a less extent, by other countries. The effect will shortly be perceptible upon our commerce,

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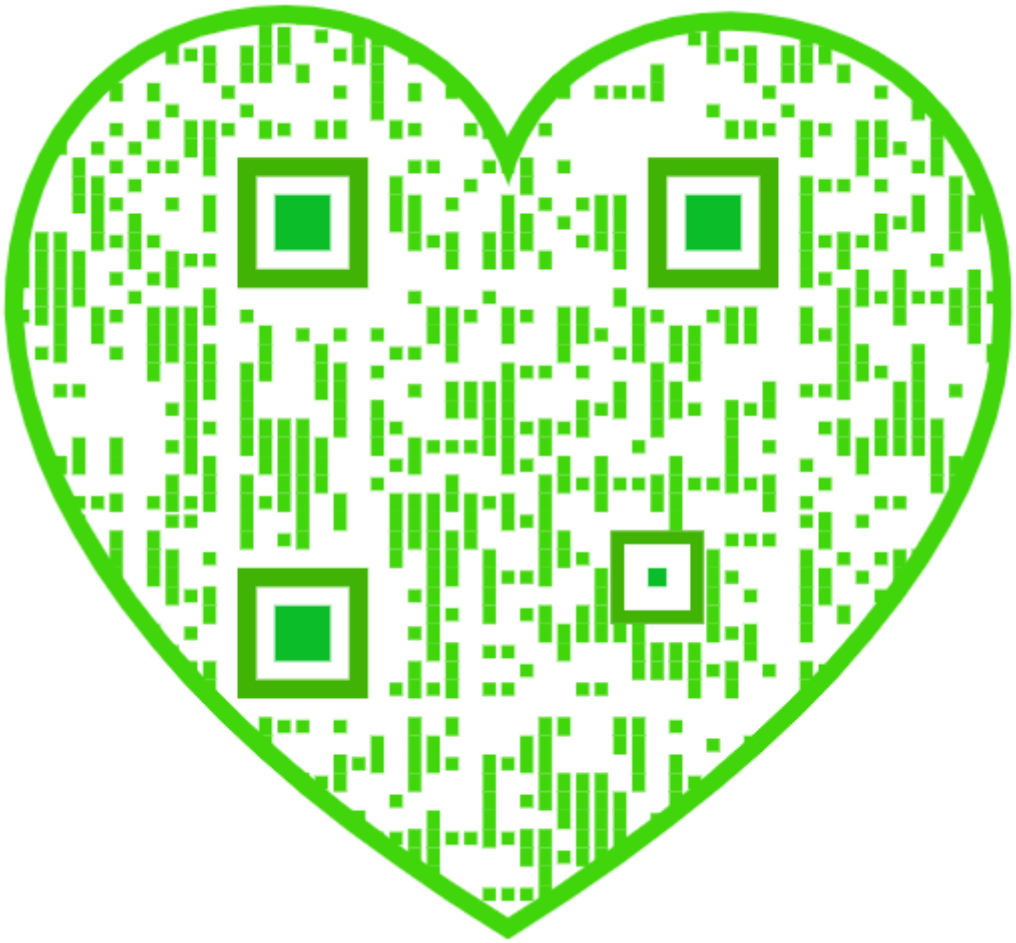

if that degree of wisdom attends mercantile builders which is to be expected, and which has been proved by abundant trials elsewhere; while the fabrication will add a growing value to that peculiar business which must always remain at home most in Pennsylvania. The people of New England contemplate establishing a wire-rigging factory in Maine. If the right steps are taken seasonably here there will be no occasion for their doing so, since the material is at hand here which must be transported there, and our knowledge of the business exceeds theirs by a large amount.—*Phila. Gazette.*

NOTES ON NEW DISCOVERIES AND NEW APPLICATIONS OF SCIENCE.

TUNGSTEN OR WOLFRAM.

There seems some probability that metallic tungsten may shortly be introduced into commerce and the arts. This metal was first isolated in 1783, by two Spanish metallurgists, the brothers D'Elhujart. Two years previously Scheele had discovered in the Swedish mineral "tungsten" (so named on account of its density, "tung" meaning heavy and "sten" stone) a new acid, which Bergmann had immediately suspected to belong to a new metallic element. The brothers D'Elhujart found this same acid in the mineral "wolfram," and at length succeeded in separating the metal from it. Bergmann had suggested that the metal which he felt certain would be found in this acid should be called "tungsten," after the mineral in which the acid was first discovered; but the brothers D'Elhujart named it "wolfram," from the mineral from which they actually obtained it. It was subsequently proposed to use for the new metal, instead of either of these names, that of Scheele, the distinguished chemist who had first detected the existence of tungstic acid, but "Berzelius set this suggestion aside, with the just remark that his countryman's immortality required no such artificial prop," and the names tungsten and wolfram are now both used, the metal being usually spoken of by the former name in England and France, and by the latter name in most other countries. The mineral which is called wolfram is a double tungstate of iron and manganese, and usually contains about seventy-five per cent of tungstic acid. It is found in Cornwall, Devonshire, and Cumberland; in Bohemia, Saxony, and other parts of Germany, and also in France, Sweden, and South America—England, Sweden, and Bohemia, being, however, the only countries, so far as is known at present, in which it occurs in any considerable quantity. Tungstic acid is reduced somewhat readily when heated in a current of hydrogen, but by this method the metal is obtained only as a dense dark-gray powder, exceedingly difficult of fusion. The brothers D'Elhujart did not succeed in fusing this powder, and there are upon record only two instances in which its fusion has been effected at all, and in those instances only very small quantities were fused. M. Riche fused a few grammes some years ago by means of a current from a battery of two hundred Bunsen cells belonging to the Faculty of Science of Paris, and in the International Exhibition of 1862 was a very small button of tungsten which Mr. Frederick Versmann had obtained by subjecting about an ounce of the powder for three hours to the most intense heat he could obtain by means of a powerful gas furnace. He used for the purpose a crucible of freshly burnt lime, having found that no graphite or Hessian crucible would stand the requisite heat. We now learn that a Swedish metallurgist has dicovered a method of reducing tungsten by which he obtained it at once in a state of fusion, and that ingots of the pure metal weighing several pounds each are now on exhibition at Stockholm. We are informed, too, that the cost of obtaining tungsten by the new method does not exceed a few shillings per pound. If really obtainable thus cheaply, a metal which will bear exposure to so intense a heat without undergoing either fusion or oxidation must prove of incalculable value to certain of the arts, provided that the difficulties in the way of working it are not insuperable. With the exception of gold and platinum, tungsten is the heaviest metal yet known. Its specific gravity is about 18, that of gold being 19·36, and that of platinum 21·53.

MATCHES WITHOUT PHOSPHORUS.

We had occasion, some months ago, to draw attention to the terrible effect upon the health of the workmen engaged in the manufacture of the phosphorus which enters into the composition of the lucifer matches at present in use, and to mention that Dr. Hierpe, of Stockholm, was engaged in an earnest endeavor to discover some means of producing effective friction matches without the aid of a substance the whole of our supply of which ought to be devoted to the fertilization of the soil, and which, when employed in the arts in the free state, is so frightfully injurious to those who are unfortunate enough to have to manipulate it.

Dr. Hierpe has since patented, both in Sweden and some other continental countries, a composition for the tips of friction matches, consisting of a mixture of four to six parts of chlorate of potash with two parts of bicarbonate of potash, two parts of either peroxide of iron, protoxide of lead, or deutoxide of manganese, and three parts of glue or other cement. Matches tipped with this composition will only ignite when rubbed upon a surface specially prepared. For this igniting surface Dr. Hierpe uses a mixture of twenty parts of sulphide of antimony with two to four parts of bicarbonate of potash, four to six parts of either oxide of iron or oxide of lead, and from two to three parts of glue. The new matches are no more costly than the old ones, and, besides having the advantage of their manufacture being innoxious, and not involving the consumption of any substance which ought not to be spared from other purposes, are immensly *safer* than our ordinary matches, since they will not ignite except when rubbed upon a composition prepared expressly for the purpose.

GUN-COTTON ENGINE.

A "gun-cotton engine," invented by M. Jules Gros, is favorably reported upon by *Les Mondes*. No particulars of its construction are given, but we gather that it applies the force generated by combustion of gun-cotton to the compression of atmospheric air, and then employs the air thus compressed to work a piston. Its principle is thus the same as that of a gunpowder engine devised by the writer of these "Notes" some five years ago.

IRON IN BLOOD.

M. Pelouze has been making investigations respecting the quantity of iron contained in the blood of different animals. He finds that the blood of birds contains, per ten thousand parts by weight, from three to four parts of iron, and the blood of man, and that of mammaliferous animals generally, contains from five to six parts of iron per ten thousand parts of blood.—*Mechanics' Magazine.*

Galvanized Iron as a Ship-building Material.

It has long been admitted that, although iron is, undoubtedly, the most suitable material for the construction of ships, the readiness with which it fouls in sea water gives rise to much inconvenience; the consequence has been that almost innumerable compositions have, from time to time, been proposed to remedy the evil; yet the success obtained has been but very limited. A series of experiments have, however, recently been undertaken by Professor Crace-Calvert and Mr. Johnson, which seem to have led to the discovery of an effective remedy, and one which can be readily applied. The reliance which can be placed upon all experiments conducted under Prof. Crace-Calvert's supervision are too well known to need comment; it will, therefore, suffice to record the experiments themselves.

They took 20 square centimeters of each metal, which they cleaned with great care and attention, in order that the action of the sea water might have its full effect; then two plates of each metal were placed in separate glass vessels, and immersed in equal volumes of sea water. After one month the plates were taken out, and any compounds that had adhered to the surface carefully removed; the plates were then dried and re-weighed, and the loss estimated. To render their results of more practical value, they calculated the action of 100 liters of sea water upon 1 square meter of each metal, and found the amount of metals dissolved to be—Steel, 29·16 grammes; iron, 27·37; copper (best selected), 12·96; copper (tough cake), 13·85; zinc, 5·66; galvanized iron 1·12; block tin, 1·45, and stream tin, 1·45 grammes. Of virgin lead and of common lead the quantity dissolved was merely a trace. The conclusions to which these results obviously lead are that steel is the metal which suffers most from the action of sea water, and that iron is most materially preserved from the action of sea water when coated with zinc, and, therefore, not only should iron exposed to the action of sea water be galvanized whenever this is practicable, but, in their opinion, it would amply repay ship-builders to use galvanized iron as a substitute for that metal itself.

The extraordinary resistance which lead offers to the action of sea water naturally suggests its use as a preservative to iron vessels against the destructive action of that element; and though they are aware that pure lead is too soft to withstand the wear and tear which ships' bottoms are subjected to, still they think that an alloy of lead could be produced which would meet the requirements of ship-builders. Feeling that experiments made with a limited amount of sea water might not be a fair criterion of the action of the ocean upon metals, they repeated their experiments upon plates of 40 centimeters square, which were immersed for one month in the sea on the western coast (Fleetwood), taking the precaution that they should be constantly beneath the surface of the water, and suspended by flax rope attached to a wooden structure, to prevent any galvanic action taking place between the plates and the structure to which they were attached. The amount of metals dissolved were—Steel, 105·31 grammes; iron, 99·30; copper (best selected), 29·72; zinc, 34·34; galvanized iron (Johnson's process), 14·42; lead (virgin), 25·69; and lead (common), 25·85 grammes.

It is to be remarked that the action was much more intense in this instance than when the metals were placed in a limited amount of water at the laboratory. These results are due, probably, to several causes acting at the same time—that the metal was exposed to the constantly renewing surface of an active agent; and that there was also a considerable friction exerted on the surface of the plate by the constant motion of the water, there being at Fleetwood a powerful tide and rough seas. What substantiates this opinion is that the lead plates undoubtedly lost the greater part of their weight, not by the solvent action of the sea water, but from particles of lead detached from them in consequence of their coming in contact with sand and the wooden supports to which they were attached; but this cause of destruction having been observed with lead plates, it was afterward carefully guarded against in the case of all the other metals.

Another series of experiments was likewise made, which cannot fail to prove of great value in connection with the application to ships' bottoms of copper and yellow metal sheathing—the action of sea water upon various brasses was carefully tested. They immersed for one month plates of various alloys in that fluid, and it was found that the action of 200 liters of sea water upon one square meter of surface was:—

COMPOSITION OF THE BRASSES.

	Copper.	Zinc.	Iron & Lead.
Pure copper and zinc.....	50·0	50·0	...
Commercial brass	66·0	32·5	1·5
Muntz metal (sheets).....	70·0	29·2	0·8
Muntz metal (bars)	62·0	37·0	1·0
Prepared brass.....	50·0	48·0	*

*And 2 per cent of tin.

QUANTITY OF METALS DISSOLVED.

	Iron.	Copper.	Zinc.	Total.
Pure copper and zinc.		1·110	10·537	11·647
Commercial brass....	0·579	3·667	3·324	7·570
Muntz metal (sheets).	0·438	4·226	2·721	7·385
Muntz metal (bars)...	0·501	2·697	3·493	6·691
Prepared brass	†	7·040	3·477	10·882

†0·365 of tin dissolved.

This table shows how very different sea water acts upon divers brasses, and the influence exercised upon the copper and zinc composing them, by the existence in them of a very small proportion of another metal; thus, in pure brass the zinc is most rapidly dissolved (which, *en passant*, is the contrary to what takes place in galvanized iron), while it acts as a preservative to the copper. Tin, on the other hand, appears to preserve the zinc, but to assist the action of sea water upon the copper. The great difference between the action of the sea water upon pure copper and upon Muntz metal seems to us to be due not only to the fact that copper is alloyed to zinc, but to the small proportion of lead and iron which that alloy contains; and there can be no doubt that ship-builders derive great benefit by using it for the keels of their vessels. They were so surprised at the inaction of sea water upon lead, that they were induced to compare its action with that of several distinct varieties of water—Manchester Corpora-

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tion water, well water, distilled water in contact with air, and the same deprived of air; and the figures obtained confirmed their previous result, that sea water has no action on lead, except what arises from friction.—*Mining Journal.*

A New Explosive Substance.

Glycerine, as we all know, is the sweet principle of oil, and is extensively used for purposes of the toilet, but it has now received an application of rather an unexpected nature. *Galignani* states that in 1847, a pupil of M. Pelouze's, M. Sobrero, discovered that glycerine, when treated with nitric acid, was converted into a highly explosive substance, which he called nitro-glycerine. It is oily, heavier than water, soluble in alcohol and ether, and acts so powerfully on the nervous system that a single drop placed on the tip of the tongue will cause a violent headache that will last for several hours. This liquid seems to have been almost forgotten by chemists, and it is only now that Mr. Nable, a Swedish engineer, has succeeded in applying it to a very important branch of his art, viz., blasting. From a paper addressed by him to the Academy of Sciences, we learn that the chief advantage which this substance, composed of one part of glycerine and three of nitric acid, possesses, is that it requires a much smaller hole or chamber than gunpowder does, the strength of the latter being scarcely one-tenth of the former. Hence the miner's work, which according to the hardness of the rock, represents from 5 to 20 times the price of gunpowder used, is so short that the cost of blasting is often reduced by 50 per cent. The process is very easy. If the chamber of the mine present fissures it must first be lined with clay to make it water-tight; this done, the nitro-glycerine is poured in and water after it, which, being the lighter liquid, remains at the top. A slow match, with a well charged percussion cap at one end, is then introduced into the nitro-glycerine. The mine may then be sprung by lighting the match, there being no need of tamping. On the 7th of June last three experiments were made with this new compound in the open part of the tin mines of Altenburg, in Saxony. In one of these a chamber 34 millimetres in diameter was made perpendicularly in a dolomitic rock 60 ft. in length, and at a distance of 14 ft. from its extremity, which was nearly vertical. At a depth of 8 ft. a vault filled with clay was found, in consequence of which the bottom of the hole was tamped, leaving a depth of 7 ft. One liter and a half of nitro-glycerine was then poured in—it occupied 5 lt.; a match and stopper were then applied as stated, and the mine sprung. The effect was so enormous as to produce a fissure 50 ft. in length and another of 20 ft.; the total effect has not yet been ascertained, because it will require several small blasts to break the blocks that have been partially detached by this.—*Mechanics' Magazine.*

Work in Machine Shops.

The Providence Steam Engine Company, of Providence, R. I., the builders of the engines of the United States steamers *Pawtuxet* and *Algonquin*, are now engaged upon two pair of sixty-inch cylinder engines for the new fast sloops in process of construction. They are also building a pair of engines with twenty-three inch cylinders and four-feet stroke, and a high-pressure engine with twelve.

The Corliss Engine Company, of Providence, perhaps cover a larger area of ground than any shop in the country; all of its buildings, however, are only one story in hight. They are building two pair of sixty-inch and one one hundred-inch engines for the new sloops and the frigate *Pompanoosne*. This company built the engines of the United States steamer *Saco;* a portion of them are now being overhauled at the shop. One of the noticeable things to be seen here is a condenser casting, all in one piece, weighing thirty-two thousand five hundred pounds; it is truly a fine piece of work. All of the other shops cast them in two pieces.

The Hope Iron Company, of Providence, is busily engaged in building the American Ship Windlass Company's windlass, a machine which has found such favor as to be in use on board of nearly five hundred vessels. It is a great improvement on the English windlass, which has been in use so many years on our vessels. With this American machine a less number of men are required; it is simple, powerful, and less liable to get out of repair than any in use. At times, the safety of the vessel, her cargo, and hundreds of valuable lives depend upon the windlass, and it is the duty of ship-owners to put on board their vessels the best of such an important part of a vessel. The Hope foundery are building an experimental engine, for their own use, upon a new, and which seems to be a practical, idea. They are also constructing a caloric engine, which is destined to throw the Ericsson machine into the shade completely.

The Wilmington Iron Works, Pusey, Jones & Co., Wilmington, Delaware, are constructing the machinery for the iron-clad *Shackamaxon*, building at Philadelphia. The machinery is from the designs of John Baird, and consists of two pair of direct-acting engines having cylinders 46½ inches in diameter and 50 inches stroke of piston. Each pair of engines will drive a screw of 15 feet in diameter. There are eight horizontal tubular boilers, each 20 feet 4 inches wide, 13 feet long, and 14 feet high, together having a heating surface of 22,500 square feet. They are also building two iron side-wheel steamers to run on the Cape Fear river, North Carolina.

The machine shops around the country generally are quite busy, and there seems to be a promise that in a few months they will have all they can do to fill orders.

The New York Fire Department.

The apparatus of the new paid Fire Department will embrace thirty steam fire-engines and ten hook and ladder trucks. To each steamer there will be attached a tender. Each steamer and hook and ladder truck will be drawn by a powerful team of horses, and the tenders by one horse each, thus employing 120 horses. The tenders will run on four wheels, and will be built somewhat like the hose carriages now in use, only on a larger scale and of stronger build. Each tender will be provided with a reel capable of carrying one thousand feet of hose, and a fuel box calculated for three hours' consumption; in front of the tender will be placed a wide seat for the driver and three men.

These thirty engines and ten trucks will all run below Fifty-ninth street, and the companies will be placed on a regular paid footing, the members being employed constantly on fire-duty, and not allowed to attend to other business. As at present contemplated, this force will comprise 480 men, beside the Board of Engineers. Each engine company will consist of twelve members—a foreman, assistant foreman, engineer, driver, stoker and seven privates. The hook and ladder companies will have the same number of members, but, not requiring an engineer or stoker, the privates will be increased to nine men. The salaries of the department below Fifty-ninth street will be, in round figures, $363,000 per annum, and will be divided as follows:—

Chief engineer	$3,500
Eight assistant engineers (each $1,500)	12,000
Forty foremen (each $800)	32,000
Forty assistant foremen (each $750)	30,000
Thirty steam engineers (each $900)	27,000
Forty drivers (each $700)	28,000
Thirty stokers (each $700)	21,000
Three hundred privates (each $700)	210,000
Total	$363,500

—*Times.*

Ventilating Machines and Furnaces.

The methods of ventilating the workings of mines fall primarily into two classes, those in which mechanical agents are employed, and those where heat alone is used for setting up a current. The former class is again divided into machines used for compressing and those for exhausting the air, the latter kind being employed almost to the exclusion of the former. In furnace ventilation, of course, the action is always an exhausting one. In the newly-invented coal-cutting machines, compressed air of from 2½ to 3 atmospheres pressure is employed as the driving power; this may prove a great incidental advantage to the process, as the air escaping from the cylinder will aid the ventilation, and will also serve to cool the workings by the absorption of heat consequent on its expansion. The use of mechanical ventilators is, in England, generally confined to supplying fresh air to a single level, the whole of the workings of a large mine being but rarely dependent upon a machine for a constant circulation; they are, however, more used in the collieries of the north of France and Belgium, where pneumatic engines of considerable size and power are commonly seen. The great ventilating agent employed in English collieries is the underground furnace, which can be made sufficiently large for the requirements of the most extended workings. Permanent furnaces at the top of the upcast pits were formerly employed to a certain extent, but are now rarely seen.

Air Pump of the Harz.—This contrivance is employed in Cornwall and the German mines for ventilating the ends of levels, and other places where the air is stagnant, by exhaustion, as it is usually of but small size, and requiring little power, it is generally attached to the rod of the pumping engine. It consists of a wooden box of a square section, open below and closed at the top, attached by a wrought-iron rod to a cross arm projecting at right angles from the main pump rod, by which it is moved up and down in an outer case, of similar shape, partly filled with water. A pipe in communication with the level to be ventilated passes up through the bottom of the outer box to within a short distance of the top. It is covered with a plain clack or valve, opening outward; two similar valves are fixed to the top cover of the inner box. As the rod ascends, a partial vacuum is established within the box, as communication with the outer air is prevented by the water-joint, and the top valves are kept closed by the pressure of the external air; the valve on the pipe inside therefore opens, and the air from the workings flows in until the change of stroke, when, by the descent of the box, the air is compressed and opens the two top valves, through which it passes freely into the atmosphere. The same principle has been applied in Belgium to the construction of large ventilating machines for collieries. At Marihaye, near Liege, a pair of wrought-iron bells or cylinders are employed, each 144 inches in diameter and about 9 feet stroke; they are suspended by chains over guide-rollers, and are driven by a direct-acting horizontal steam engine. There are 16 suction, and an equal number of exhaust valves, which, owing to the small difference of pressure produced, require to be counterbalanced with weights, in order that they may open and shut freely at the change of stroke. The amount of air drawn by this machine is about 11,500 cubic feet per minute.

Ventilating Fan Used in the Saxon Mines.—This fan is of the same kind of construction as that employed for blowing iron-founders' cupolas. It has five radial arms, with flat rectangular blades, which revolve about a horizontal axis within a cylindrical case or drum, having a circular aperture about 20 inches in diameter in the center of each of the sides; the outside diameter of the fan is about 4 feet. The air taken in at the center is discharged through a rectangular tube of 15 inches in breadth and 10 inches in hight at the bottom of the drum, and is conveyed through pipes of a similar section, made of wooden planks or sheet zinc, into the forward end of the level to be ventilated. The fan is driven by a wheel 64 inches in diameter, connected by a strap with a spindle of four inches, giving 16 revolutions of the blades for one of the driving wheel. The strap is kept at a proper tension by a friction roller, attached to a board, which slides on a pair of horizontal cross timbers, an arrangement which allows the machine to be put out of work with out stopping the driving wheel or disconnecting the strap in case, where it is only required to be used intermittently. By putting the central apertures in communication with the air tubes the fan can be used for establising a circulation by exhusting the bad air. By surrounding the fan with spiral guide-plates or diffusers, the air, instead of being discharged at a useless velocity against the walls of the drum, may be led off to the discharge pipes more conveniently and economically. Small ventilators on this principle, constructed by M. Schwamkrug, are now used in the Saxon mines; they have six arms, with blades 8½ inches square and 30 inches in diameter, and can be worked by one man at a maximum speed of from 400 to 450 revolutions per minute, with a pipe of six inches square; 60 cubic feet of air can be drawn in that time from a distance not exceeding a quarter of a mile. The quantity of air required by a man at work in the end of a level is estimated at six cubic feet per minute.—*Mining Journal,*

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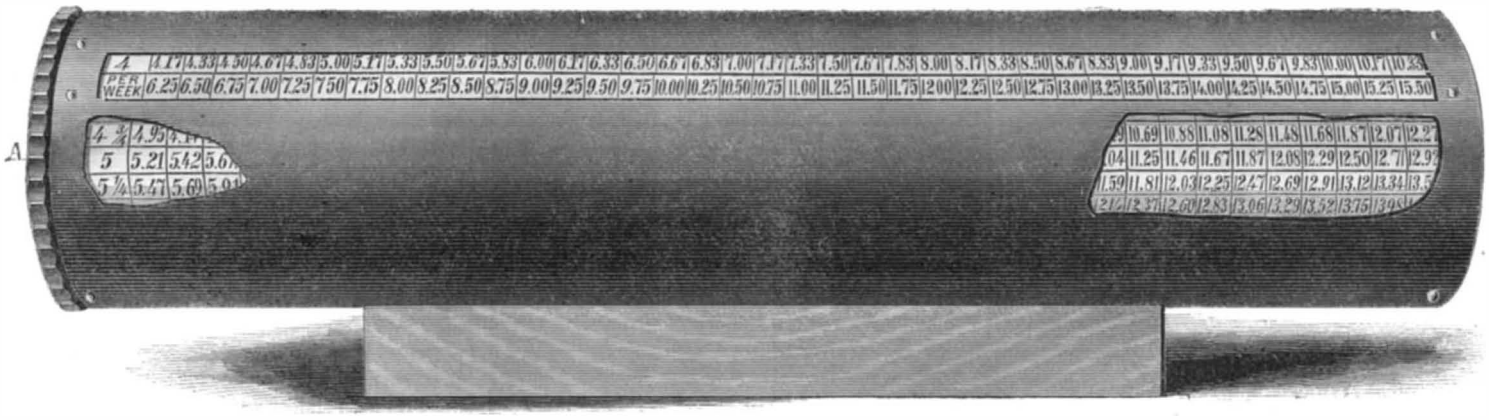
Improved Calculator.

Those who have persons in their employ to whom wages are paid at weekly, semi-monthly or monthly intervals, are often put to considerable inconvenience in making up their pay rolls with sufficient dispatch and accuracy. There is also liability to various errors in the ordinary modes of calculat-.ng wages. Calculated tables, which are generally used, having a multiplicity of figures exposed to view, are apt to confuse the eye, and for this reason



PEALE'S CALCULATOR.

are not entirely reliable. The book form of tables consumes too much time in finding the various rates of wages, each rate requiring a different page, and has the same disadvantages as the sheet form abovementioned.

By the use of the instrument herein illustrated the various causes of error heretofore existing, in the making up of pay-rolls, are entirely avoided. It consists of a cylinder, on the surface of which is arranged a calculated table; the left-hand column contains the number of days and fractions of days to be calculated, namely, 1, 1¼, 1½ days, and so on for any number of days, to suit, for weekly, semi-monthly and monthly payments. This cylinder is inclosed in a zinc case, and revolves therein on pins having a bearing in the ends of the case. It is easily moved by a milled head at the left end, and the whole is neatly mounted on a walnut base. Running nearly the entire length of the case is an opening sufficiently wide to expose but one row of figures at a time. Immediately below this opening is placed, on the outside of the case, a row of figures denoting the several rates of wages, from the lowest to the highest ordinarily paid. The operation of this instrument can be readily understood by presenting an example, as follows:—

To find the amount of wages necessary to be paid for 9¾ days at the rate of $12 75 per week, or $2 12½ per day. Turn the cylinder by means of the milled heads at the left end, until the figures 9¾, on the left-hand column, appear to view; then above the figures $12 75, denoting the rate of wages, on the outside of the case, will be found $20 72—which is the amount to be paid.

They are also arranged for calculating by the hour and half hour. This is a very useful contrivance.

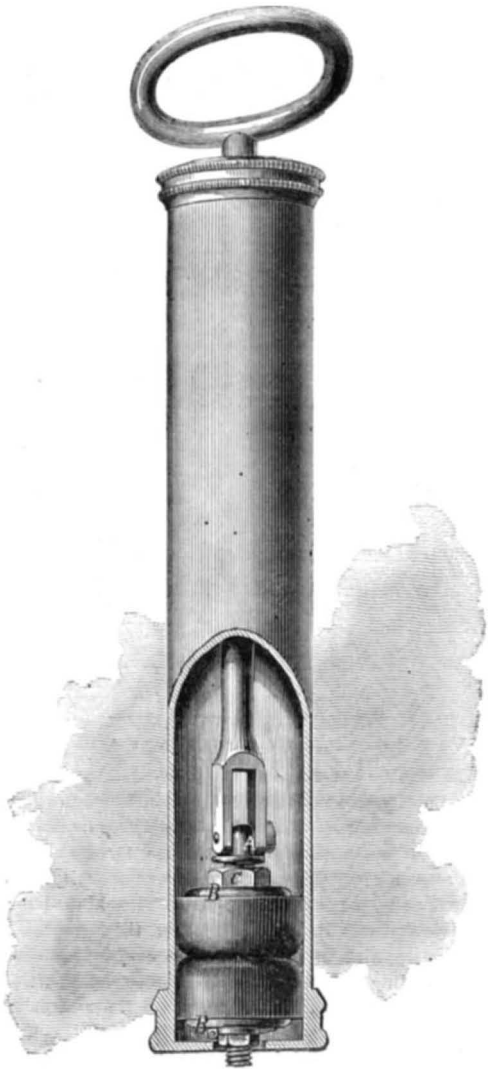
For further particulars address C. W. Peale, No. 1,600 Hamilton street, Philadelphia, who will furnish machines at $6 for weekly, $8 for semi-monthly, and $10 for monthly sizes.

Ancient Luxury.

The excavations at Pompeii are going on with an activity stimulated by the important discoveries made almost at every step, and the quantities of gold and silver found, which more than suffice to cover the cost of the work. Near the Temple of Juno, of which an account was recently given, has just been brought to light a house no doubt belonging to some millionaire of the time, as the furniture is of ivory, bronze and marble. The couches of the triclinium, or dining room, are especially of extreme richness. The flooring consists of an immense mosaic, well preserved in parts, and of which the center represents a table laid out for a grand dinner. In the middle, on a large dish, may be seen a splendid peacock with its tail spread out, and placed back to back with another bird also of elegant plumage. Around them are arranged lobsters, one of which holds a blue egg in its claws; a second an oyster, which appears to be fricasseed, as it is open and covered with herbs; a third, a rat *farci*, and a fourth, a small vase filled with fried grasshoppers. Next comes a circle of dishes of fish, interspersed with others of partridges, hares and squirrels which all have their heads placed between their fore feet. Then comes a row of sausages of all forms, supported by one of eggs, oysters and olives, which in its turn is surrounded by a double circle of peaches, cherries, melons and other fruit and vegetables. The walls of the triclinium are covered with fresco paintings of birds, fruits, flowers, game and fish of all kinds, the whole interspersed with drawings which lend a charm to the whole not easy to describe. On a table of rare wood, carved and inlaid with gold, marble, agate and lapis lazuli, were found amphoræ still containing wine, and some goblets of onyx.—*Galignani.*

ROWE'S PUMP PLUNGER.

This invention illustrates a simple and certain



method for tightening the cup leathers used in pumps and hydraulic presses for packing. In arrangement it is a bolt, A, and two washers, B. There are two nuts on the bolt, and a rubber packing between the washers, so that as the nut, C, is screwed up, the packing will be expanded by the compression of the rubber. In practice the cup leathers are set so as to just fill the pump chamber, so that when the steam comes on the packing it will be forced out by the action of the load on the rubber, as before explained. It is thus easy to see that the friction of the packing is in proportion to the labor on it, if it be properly packed at first.

This mode of packing is well adapted for pumps with untrue barrels—such as old well worn pumps, and insures the cup leather being used until entirely worn out. It is about to be adopted in the navy, constructor Hanscom having ordered the frigate *Guerreier* to be fitted with pumps having these pistons.

It was patented through the Scientific American Patent Agency on June 6, 1865, by P. C. Rowe, of Boston, Mass.

Progress of Lock Making.

In 1832 an English locksmith came to this country, settling at Watertown, Conn., and established himself in company with a resident of that town, in the manufacture of cabinet locks. They improved slightly on the old English make and finish. This experiment proved pecuniarily unsuccessful, and the Englishman sold out to one Terry, who removed the manufactory to Terrysville, and added thereto new men and more money. At that time the markets were stuffed with British goods, and the old English blacksmiths ridiculed the idea of American competition. In 1841, Mr. Terry sold out to Lewis & Gaylord, for six cents on a dollar of the capital stock. This new company progressed slowly, adding new and improved machinery, in its aid. In 1849 Mr. Lewis died, and the Lewis Company was formed by Mr. L.'s heirs taking the principal stock. In the meantime Bucknell, McKee & Co. had started the first trunk-lock manufactory in this country, and sold out in 1854, the companies consolidating into what is now generally known as the Eagle Company. Mr. Gaylord, of the original firm of Lewis & Gaylord, yet continues the lock business as a speciality, at Chicopee, Mass., and has accumulated a handsome fortune by his active industry. He is personally a worker, daily at the forge. For four years past the Gaylord Manufacturing Company has devoted all its labor to the supply of Government contracts for military accouterments. One hundred and ten men are now employed by the company, casting four hundred dozen keys, and making locks in proportion, every day. In March last their income tax amounted to over $6,000; it averages $3,000 per month. A new and commodious building is in process of construction for company offices and packing room, and they are just getting underway a steel-pen branch of their business.

Savings Banks.—In the interior towns of Massachusetts, New Bedford stands first, having savings deposits amounting to $4,554,910. The next is Worcester, $4,528,505; Lowell, $3,848,158; Salem, $3,019,504; Fall River, $2,963,563; Charlestown, $2,154,255; Springfield, $2,076,323; Newburyport, $1,955,133; Plymouth, $1,151,353; Haverhill, $1,061,736; no other place in Massachusetts has savings deposits to the extent of one million of dollars. The largest average to each depositor is in Fall River ($310), and the smallest is in Plymouth ($188 to each depositor).

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Correspondence

Force, Power and Work.

[For the Scientific American.]

Force is a mutual tendency of bodies to attract or repel each other. Its physical constitution is not yet known. We only know its action, which is recognized as pressure and measured by weight. The unit of weight being assumed from the attraction of the earth upon a determined volume of any specific substance; for example, the force of attraction between the earth and 27·7 cubic inches of distilled water, at the temperature of 39·8° Fah., in an atmosphere balancing 30 inches of mercury, at the level of the sea, which is called one pound avoirdupois. Force is the first element of Power and Work, and can be likened to length, which is a primary element in geometry. Force will here be denoted by the letter F, expressed in pounds.

Velocity is the second element of Power and Work, and may be likened to breadth in geometry. It is that continuous change of position recognized as motion, and is here denoted by the letter V, expressed in feet per second. Velocity is a simple element, although it appears to be dependent on time and space, but the space is divided by the time, and therefore both relieved from the velocity.

Time is the third element of Work, and may be likened to thickness in geometry. It implies a continuous action recognized as duration. Time is here denoted by the letter T, expressed in seconds.

Power is a function of the two first elements—force, F, and velocity, V—as area in geometry is a function of length and breadth. Power is here denoted by P=FV, which means that the power, P, is the product of the force, F, multiplied by the velocity, V. The power so obtained is expressed in foot-pounds, and called dynamic effect, of which there are 950 in a horse-power; or if the velocity is measured in feet per minute, there will be 33,000 foot-pounds in a horse-power. Power is independent of space and time, but it has often been confounded with work, which essentially depends on time and space.

Space is a function of the second and third elements—velocity, V, and time, T—and may be likened to a cross section of a solid, which is a function of breadth and thickness. Space is here denoted by S=VT, which means that the space, S, is the product of the velocity, V, and the time, T, expressed in linear feet.

Work is a function of the three elements—force, F, velocity, V, and time, T. It may be likened to a solid in geometry, which has the three dimensions, length, breadth and thickness. Work is here denoted by W=FVT, which means that the work, W, is the product obtained by multiplying together the three elements—force, F, velocity, V, and time, T.

Work may also be denoted by W=FS, or the product of the force, F, multiplied by the space, S, where it appears as if the work was independent of time, but the time is included in the space, S=VT.

Work may also be denoted by W=PT, which means the power, P, multiplied by the time, T. Either of the three cases expresses the work in foot-pounds.

Force, velocity and time are simple physical elements.

Power, space and work are functions or products of those elements.

The Scientific American is read by most mechanics in this country, and it may be further said that that journal is met with in most parts of the world. It evinces a habitual and sincere desire to furnish its readers with correct and instructive articles on scientific subjects; in consideration of which it would be a neglect of duty on my part to pass over in silence its article on "Work and Power," published on page 71 of the present volume. In that article you say: "The main purpose of Mr. Nystrom seems to be to deny the position that work is independent of time, and he has succeeded in involving the question in considerable confusion." And you think "the facts of the case are simple and plain enough." You proceed to give an antithetical description of what work is, and say: "In this case, however, we have attached the word *work*, a meaning for which the word *power* is employed by the standard writers on mechanical philosophy." Now you will allow me to remark that, in this expression, you have, together with the standard writers, confounded *work* with *power*. You have thus not followed your own good advice, namely, "to free our minds from confusion" by taking "most important steps to use words always in their exact signification." You then go on to say: "Regarding work as the overcoming of physical resistance, it is plain that the aggregate amount of any given quantity is independent of the time required for its performance." Do you not here convey the idea that *work is independent of what it requires*, namely, the *time?* You evidently mean to say that a given quantity of work may be performed in any desired length of time; but you do not seem to conceive that the work is dependent on whatever time is required for its completion.

Referring to a geometrical figure, you may be able to comprehend the position of your argument about work, which is substantially this—*the cubic content of a pancake is independent of the thickness required to make it up!* You say: "The question whether it (work) is independent of the time depends entirely upon the meaning of the language employed." To this I respectfully object, inasmuch as I recognize only one meaning in the language I have employed; and, indeed, the entire controversy upon this subject appears to have sprung from a rejection or misappreciation of the specific meaning I have struggled to establish to the terms *force*, *power* and *work*. But supposing, for the sake of argument, that my general language is not sufficiently clear, if you can read my algebraical formulas you will not misunderstand me. Why, therefore, do you not exemplify your argument upon my formulas and thereby show its effect in practice? To say that "work is independent of time," is to say that work is dependent of no time, or that any amount of work may be performed in no time—a proposition which is not yet realized.

Work, as before stated, is the product of the three elements—force, velocity and time. For a given quantity of work, either one or two of these elements can vary *ad libitum*, but only at the expense of the remaining two or one. Work is thus not confined to any specific relation or ratio to either of those elements, but independent of either of them, it ceases to be work.

I am well aware that the standard authors have, to this day, considered work independent of time, and they have also confounded force, power and work with each other, so that we are yet thrown upon our individual authority to decide which is right. Thus, when you and Professor Wood cannot defend your position, it may be very convenient to assert that I use "cant phrases" when I exemplify your arguments, and that "by analogous tricks of language we may confuse our minds in regard to any problem whatever." I nevertheless trust that I have given both perspicuity and precision to my language and meaning in this article, and sincerely hope that it may be tributary to "the consummation—devoutly to be wished for"—of reducing to certainty and system the future reasonings of the scientific world on this subject.

John W. Nystrom.

Straightening Gun-barrels.

Messrs. Editors:—Please inform me of the theory of straightening gun-barrels by the process of looking through them at the light. H. A. M. H.

Philadelphia, Aug. 14, 1865.

[If through a gun-barrel, the bore of which is brightly polished, you look at a sheet of white paper, you will see a series of dark rings, alternating with bright spaces. If the barrel is perfectly straight these rings will be precisely concentric—in other words, the space between any two will be precisely of the same width all round. But the slightest crook in the barrel will cause part of the rings to appear at one side of the center. If the barrel be pointed at a stretched string, the string will be seen across the diameter of the bore, and its reflection will appear at each side crossing the rings. When the barrel is straight the reflected image of the string will form a continuous straight line with the string itself, but any crook will produce a curve in the line of the reflected image. The rings are caused by interference of light.—Eds.

New Chuck for Wood or Metal.

Messrs. Editors:—Several kinds of chucks are employed for holding work between two centers; for wood, prong chucks or square hold are the most common; for metal, dogs are usually employed; the disadvantage of the above-named chucks for wood is, that the work frequently gets out of center, when any pressure is used, and it cannot be taken on and off for examination without a risk of missing the center, when replaced.

The disadvantage in using dogs, when turning metal, is the necessity of turning the work end for end, which requires the dogs to be shifted—when you wish to turn a cylinder, for instance, or when you wish to file a cylinder on the lathe; and another nuisance of dogs is, the catching of the tool or fingers against the projecting points of the dogs.

To obviate these inconveniences, I invented a very simple contrivance for holding work between two centers, which is equally applicable to wood or any kind of metal, and the same chuck will hold as firm as a vise a piece of wood or metal half an inch or even twelve inches in diameter. It, moreover, enables the tool of the slide rest, or the hand tool, to pass over the whole length of the work, without turning it end for end; and you can take the work off fifty times and replace it with perfect accuracy.

This chuck is merely a short cylinder of brass or of iron, which screws on to the lathe head with a steel point projecting from the center of the other end, and three steel points at a short distance from this center point, but not projecting quite as far out. These three points are equidistant from each other and from the center point. The projection is about one-quarter of an inch, more or less, according to the nature of the work.

Fig. 1. Fig. 2.

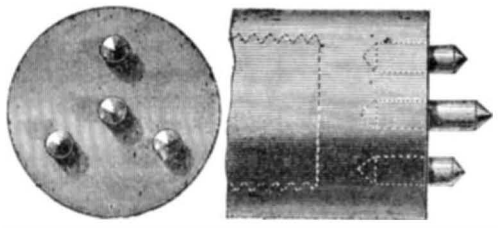

Fig. 1 shows the face of the chuck with four points projecting. Fig. 2 shows a side view of the chuck.

To make this chuck I drill four holes in the face of it, each about half an inch deep, with a drill corresponding with any size of Stubb's steel wire—one of my chucks is drilled to No. 15, another to 22. I then cut off three pieces of Stubb's steel wire of one size smaller than the holes drilled, and point each one on the lathe, and dip the blunt ends into melted tin after dipping them into muriate of zinc. I heat the chuck on a stove, drop into each hole a little muriate of zinc, and then, with a pair of pincers, put in the steel wires, with the points outward; and when cold the chuck is finished. To use it, drill a center hole in each end of the work to be turned, with the same drill employed to make the four holes; put the center point of the chuck into the center hole of the work, give it a tap with a mallet, and you will have three marks, which will enable you to drill the other three holes in the work, with the same drill.

These four points, when inserted into the piece to be turned, and when the other end of the piece is held by the point of the puppet head of the lathe, will keep it as firm as if held by a vise, and it can be taken off and replaced without regard to which of the three outer points is inserted—for if drilled equidistant, all will fit the work.

A bar of metal, in which the four holes have been drilled, can be used up until within one-fourth of an inch of the end, and once the chucks are made and the proper drill at hand, it will be found as easy to mark and drill the four holes in the work as to adjust and screw up a pair of dogs, especially if you have several pieces of metal or hard wood to turn.

I have found—equally with others to whom I have shown my chucks—so much comfort in the use of them, that I freely impart to any mechanic the knowledge how to make this chuck, and the right to use it. E. J. W.

Lenox, Mass., Aug. 7, 1865.

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Compensation and Loss in the Universe.

[For the Scientific American.]

Nature is a vast system of compensations. Like the tight-rope walker she preserves her equilibrium by perpetual oscillations. Evergreenness and variety bloom everywhere by the endless succession of decay and growth. But, on the whole, in all that is physical, is there a general and progressive exhaustion? Have the compensations and repairs in the physical universe, like those in the human body, no power to prevent a gradual but inevitable decline? Not so, it seems. But, perchance, science is not old enough to see more than the beginning, where life is poised with death.

That the present condition of the material universe cannot continue forever, all the past and the progressive changes of the present plainly attest.

"The constellations seem drawn from the ravished portions of the sky," says a distinguished astronomer. Now and then a planetary aerolite is drawn from its orbit to the earth; much larger numbers must fall upon the inferior planets, perhaps affecting their habitability. Encke's comet slowly approaches the sun, while, according to Meyer, Tyndall and others, solar heat is replenished by a ceaseless storm of lesser planets which fall upon its surface. The earth once aglow has gone out; the brightness of many stars wanes from age to age—the luster of our own sun will pale at last.

Modern science asserts not the persistence of the present order of creation, but the perpetuity, in some form, of the forces working in it. It denies the creation or destruction of force. All the phenomena of vegetable, animal and intellectual life have added nothing to, and taken nothing from, the physical forces of the universe, however they may have affected the moral.

What is force? What is light? What is heat? Vibrations among the atoms of matter, or in intermolecular ether. The atomic theory has greatly enhanced the facility and precision, and, doubtless, the correctness of philosophical discussion. We can as easily apply our reasoning to the atomic structure of bodies as to their visible masses. Force, then, resolves itself into simple impulse of matter, which is as referable to atoms as to sensible bodies.

A certain initial impulse was communicated to matter at first; or from its position and possible changes certain definite degrees of force can arise. Can any part of this impulse be lost? The rays of light may conflict. Those from the same source, turned aside by various media, and reflected by various solids, will collide; for a much stronger reason, the beams from different stars will clash and annihilate each other, striking out here one color and there another, and sometimes all. Could our eyes behold it, under the intenser gush of yellow light plays the endless change of rainbow tints, filling the whole ether with dots and stripes of iridescent hue. Where goes the light thus disappearing? There is as yet no evidence that it is changed to heat. There is no positive proof that such collision does not destroy force. A taper, burning only on the surface of the illuminated tract, gives nearly as much light as a solid cone, because, in the latter case, there would be a collision of rays and a destruction of light. Light is converted into heat when it impinges upon a colored surface, and each especial color, in its disappearance, may assist peculiar chemical changes in the vegetable world. There is yet much to be learned in regard to the temperature of polarizing spars. As yet, no experimental evidence exists of the generation of heat by the direct collision of the waves of light.

One of the latest and ablest advocates of the perfect conservation of forces is Tyndall, who has labored so successfully in the department of heat. He restricts the convertibility to heat and mechanical action, or resistance, making no allowance for the interchangeability of light and heat, or for the generation of any irregular motions, not appearing as any known force.

It seems very improbable that friction, as usually applied, should generate motions so accordant as wholly to avoid collision, or that all collision should simply render the impulse expanded in some other form. It is not probable that the destruction of heat vibrations would produce light, and the experiments of Becquerel seem to prove that heat alone cannot produce electricity. The experiments from which Prof. Metcalfe and others reasoned were, doubtless, faulty. Again, compression produces heat, and stretching, cold. Friction is a union of both—a generation of heat and a destruction of heat; a shaking of the atoms into motion, and a seizing of the atoms to arrest their movement; hence there is an outlay of force that makes no return of heat.

A truer conservation of forces would be the equality of mechanical power, and the sum total of the forces excited. Electricity is as invariably a result of friction as heat.

Why any reluctance to admit the disappearance of force in the realm of nature? There may be a sublimer conservation of forces, which renders them, in some spiritual sense, back to their Author, to be sent forth on a new creative mission. Were they not once created by the Spirit? Are these forces—light, heat, electricity—coexistent with the Deity?

All along the geologic ages miracles of creation were performed; why may not forces be created? These material forces minister to the growth of mind; they render to the spirit world spirit power; what strange if the Spirit again create them anew?

E. S. Jeon.

Duffus's System for Refining Petroleum.

Messrs Editors:—In the Scientific American of August 19th you describe the operations of my improved still for the refinement of petroleum oils. As it may be interesting to your readers, I inclose the following statement, which is one out of many similar results of the ordinary distillations that occur during the operation of the still:—

Charge of 100 gallons crude petroleum; gravity, 45° Beaume; temperature, 56 Fahrenheit. The distillation commences when the heat reaches 200°. The gravity of the first run is 76°; temperature, 53°. The following table exhibits the progress of the distillation, the heat being noted by a pyrometer used in the still:—

Heat—Deg.	Temperature.	Gravity.	Gallons Run.
215	52	75	3
236	54	70	2
250	52	67	3
285	52	65	2
315	53	62	3
345	50	61	3
370	51	59	3
385	52	58	3
400	51	57	3
415	52	56	3
425	50	55	3
440	52	54	3
455	51	53	3
485	51	51	3
505	52	50	3
525	52	49	3
560	53	47	3
595	50	46	3
630	52	55	3
650	51	43	3
662	52	44	3
670	49	43	3
[The heat is retained at this point until the operation is completed.]	50	43	3
	51	43	3
	50	44	3
	50	43	3
	53	43	3
	52	43	3
	51	43	3
	53	42	3
	54	43	3
	56	43	3
	56	41	3½
Total gallons.....			97½

The net result, then, is: water evaporation, 1½ gallons; benzine, 12 gallons; refined oil, 84 gallons; heavy oil, 2½ gallons. The refined oil stands a fire test of 120°.

Geo. H. S. Duffus.

New York, Aug. 21, 1865.

Steam Blast for Iron Furnaces.

Messrs. Editors:—I notice on page 324, Vol. XII., Scientific American, an article headed "Novelty in Iron Smelting." I was much pleased with it, as I have looked forward to such results—that artificial draught can be procured without the noisy and expensive blast. Since I noticed this article in your most valuable paper, I partly succeeded in getting a neighbor to try it, offering to bear part of the expense; but for the want of confidence, or not having steam enough, he made a failure of it, and again resorted to the old fan. I was not well at the time. I am now putting up a new cupola, and if I can get such information as to insure success on the subject, will try it thoroughly. Has any one tested the principle in this country? If this plan will not do, where can I get the best fan? We want something better and cheaper than the old fan blast. Who will be the first to invent it? H. P. T.

Memphis, Tenn., Aug. 23, 1865.

[This inquiry relates to a plan which was tried some time since in England, for creating a draught in foundery furnaces by throwing a jet of steam into the chimney. We publish it in the hope that some of our readers may be able to furnish the information desired. If it were necessary to generate steam by a separate fire, it would be an expensive mode of creating a blast, but if the plan of placing the boiler around the chimney and generating steam by the waste heat of the furnace should prove successful, it might be economical as well as convenient.—Eds.

Cable---Cockroaches.

Messrs. Editors:—In reading of the breaking of the Atlantic cable it struck me that it might have been recovered by using the three grapnels at once; it was a blind thing to attempt to raise it with one, as the weight increased with the hight it was raised. After the first grapnel had raised it a portion, say 600 fathoms, the second should have been attached; and after the two had raised it, say 1,200 fathoms, the third should have been attached; in that manner the three would have been strong enough to raise it to the surface.

A good plan to destroy roaches, without the danger of using poison, is, to fill a basin, or similar vessel, about two-thirds full of water sweetened with molasses, and set it in a corner where they most frequent of a night, and where they can get on the vessel; you will find in the morning as many as the liquid will drown. I have rid my house of them in this way, destroying hundreds in a night.

James Johnson.

Washington, Aug. 27, 1865.

Another Suggestion in Relation to the Cable.

Messrs. Editors:—Upon the score of old acquaintance—having been a constant reader of the Scientific American since the days of Rufus Porter and his "Air Ship"—I venture to renew a suggestion before made to you.

When preparations were being made for laying the first Atlantic cable, I wrote you that the surest way to lay the cable was from the decks of the *Great Eastern*, through a water-tight compartment, located as nearly as might be in the center of the ship.

In the last failure they made use of the ship, but neglected the most important part of the suggestion, to wit, paying out the cable through the ship's bottom at the center of motion. Here the lateral and vertical motion of the ship is nearly nothing, and the cable would quietly enter the ocean entirely below the influence of waves or winds, and would be protected by the ship itself until it was hundreds of feet below the surface.

I do not propose to try for a patent on this method of laying cables, but feel confident that if it had been made use of in laying the last cable, we should today have been holding telegraphic converse with John Bull.

I do not flatter myself that an obscure Yankee's notions will receive attention, but nevertheless there are very many valuable notions in the world that go no further than the head that conceived them. For my own part I would like to see more of them in your columns, where they may serve the purpose of a "finger board" to point out to some shrewd inventor the road to fame and fortune J. H. Sargent.

Cleveland, Ohio, Aug. 27, 1865.

Platinum Crucibles for Glass Melting.

Messrs. Editors:—In a late number of the Scientific American the following remarks are made by Mr. H. M. Raynor in an article on platinum:—"As a matter of interest to another trade, I may mention the use of platinum crucibles, instead of clay, at the

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great glass factory at St Gobain, France, by M. Pelouze, in order to obtain the purest possible glass, free from the yellow tinge which has been so difficult to banish from clear flint glass." I cannot understand how the substitution of platinum for clay in the crucible will make any difference in the color of the glass. No clay pot that I know of will alter the color of glass; what platinum may do I do not know, but should think that, from continued heat, it would oxidize, and if so, would enter into the glass and color it. The yellow tinge spoken of may be a difficulty at St. Gobain, but is not so here, in the United States; and I am inclined to think that the difficulty M. Pelouze meets with is not from his crucibles (pots), but from his materials. As Mr. Raynor appears to speak by the card, will he tell why amorphous and pulverulent phosphorus is used in place of charcoal? or why charcoal was used? how much each crucible contains in weight of glass? also, the thickness, weight and cost of each material?

If platinum crucibles can be made to stand heat, and fluxes at a reasonable price, and will last, on a guaranty, say four months, a large business can be done, for it is a well-known fact that the success of the business, in nine cases out of ten, depends on the length of time the crucibles stand.

I am much surprised that glass blowers and manufacturers take so little interest in the scientific part of their art. Fewer improvements have been made in the glass business than any art or profession that I know of; indeed, since the invention of the press, I know of no valuable improvement whatever.

The principal reason why matters pertaining to the art are not more publicly discussed, I presume, is the desire to keep the formula secret. This, I believe, is the principal reason why so few real improvements occur. I contend there is no necessity for this secrecy. The possession of ever so many recipes amounts, in the manufacture of glass, to nothing; practice is everything. Even should there be an objection to divulge the proportions used in the "batches," there are many other matters that could be discussed that would be beneficial to the trade, such as the proper size and shape of furnaces; whether the round or square furnace is the most convenient or economical for flint pots; the best material for making furnaces, clay or sand-stone for benches; experience on native clays for furnaces or pots; the proper size for pots; the proper size for eyes; rise of caps, etc., and a host of questions that occur in the trade that would be better for being ventilated and discussed.

There is at this time a desire becoming general to introduce gas as fuel in the furnaces. I know that much money has been expended to solve the question of its practicability. It is reported to be in use in Pittsburgh, Pennsylvania; it is known to have been used in England, but with what success I cannot learn. Information on this subject, gas, and any other pertaining to the business, given in a plain manner, dispensing with the use of scientific terms when it can be done, would be beneficial to the artist and manufacturer; and I have no doubt the SCIENTIFIC AMERICAN would afford room in its valuable columns for the information. F. H. S.

Millville, N. J,, Aug. 21, 1865.

[We shall be glad to give our glass-making friends a hearing.—EDS.

Gunpowder---Jupiter's Moons.

MESSRS. EDITORS:—On page 36, SCIENTIFIC AMERICAN, Mr. F. G. Fowler writes that the theory of the conversion of heat into motion does not account for the force developed from one pound of powder applied to an eight pound ball. To show that the whole force due to the combustion of the two ounces of carbon is not applied to the ball, three points are to be noticed: First, the combustion is very imperfect, the volume of smoke being so much carbon not consumed; second, the capacity for heat of the iron of the gun is so great that it would absorb a great part of the heat of the carbon without raising the heat of the gun very much; third, one-half the force obtained is expended in giving motion to the gun. Could these results be measured they would probably account for the force not utilized in moving the ball.

Can any of your readers explain the following phenomenon?—If Jupiter be reflected in a looking-glass two apparent moons are seen. If the glass be turned one-quarter round, in the same plane as before, these moons appear at right angles to their first position. They are not seen when the planet is reflected in quicksilver, nor are they in the true position of Jupiter's moons. No other planet or star gives a similar reflection in a looking-glass. T. McD.

Newburgh, July 17, 1865.

[The smoke resulting from the combustion of gunpowder is different from that produced by burning wood or coal. Gunpowder is made of sulphur, charcoal and saltpeter—saltpeter, nitrate of potash, being composed of nitrogen, oxygen, and the metal potassium. In burning, the saltpeter is decomposed, its oxygen combining with the carbon of the charcoal to form carbonic acid; the sulphur and potassium uniting to form sulphide of potassium, and the nitrogen being set free. KO, $NO_5+S+3C=KS+3CO_2+N$. These are the theoretical reactions in case of perfect combustion; in practice the products are numerous, and vary with the conditions under which the powder is burned; but whenever sulphide of potassium is produced, that, being a solid, will form a portion of the smoke. To calculate the force of gunpowder *a priori*, even in case of perfect combustion, is a very complex problem, as the heat consumed in the chemical decompositions, as well as that generated by the combinations, must be taken into account. The specific heat of iron is 0·1138, only one-ninth that of water.

Prof. Treadwell contends that much more of the force of the powder is expended upon the ball than upon the gun, as the same pressure acts on both, but acts on the ball through a greater space.

Before any of our readers attempt to explain the question in relation to Jupiter's moons, we respectfully suggest that they try the experiment, and see whether there is any truth in the statement. Jupiter is now visible in the evening—being the brightest star in the southern sky, and the experiment may be easily tried.—EDS.

Another Plan for Perpetual Motion.

MESSRS. EDITORS:—Being aware that you do not believe in the realization of perpetual motion, because action and reaction work with equal power in different directions, and a body put in motion by a power will cease as soon as said power is exhausted, which is true, permit me, however, to advance the opinion that it may be accomplished on the principle of attraction and repulsion, by which all the celestial objects receive perpetual motion. For instance, let two wheels be attached by gearing, to move in different directions, but make equal revolutions—the lower primary wheel supplied with a metallic ball, and the upper secondary wheel semi-attractive and repulsive, so that the attractive part will be in conjunction with the ball on its ascent, and the repulsive part on its descent. There is no power needed to put said machine in motion, as the attraction of the earth will cause the ball to descend, and momentum in addition with the upper attraction to ascend, and when beyond its meridian the repulsive part will again let the earth perform its natural law.

J. L. JURGENS, of the Isle of Tohr, Denmark.

Washington, August, 1865.

[We receive a good many perpetual motion schemes which we throw into the waste basket, but there occasionally comes one of a little more intricacy than the average which we are induced to publish, as many persons like the exercise of unraveling the fallacy.—EDS.

The Fool and His Money.

The lucky miner hastens down to Victoria or San Francisco, and sows his gold broadcast. No luxury is too costly for him, no extravagance too great for the magnitude of his ideas. His love of display leads him into a thousand follies, and he proclaims his disregard for money by numberless eccentricities. One man who, at the end of the season, found himself possessed of $30,000 or $40,000, having filled his pocket with twenty dollar gold pieces, on his arrival in Victoria proceeded to a "bar-room," and treated "the crowd" to champagne. The company present being unable to consume all the bar-keeper's stock, assistance was obtained from without, and the passers by compelled to come in. Still the supply held out, and not another "drink" could any one swallow. In this emergency the ingenious giver of the treat ordered every glass belonging to the establishment to be brought out and filled. Then, raising his stick, with one fell swoop he knocked the army of glasses off the counter. One hamper of champagne, however, yet remained, and, determined not to be beaten, he ordered it to be opened and placed upon the floor, and jumping in, stamped the bottles to pieces with his heavy boots, severely cutting his shins, it is said, in the operation. But although the champagne was at last finished, he had a handful of gold pieces to dispose of, and walking up to a large mirror, worth several hundred dollars, which adorned one end of the room, dashed a shower of heavy coins against it, and shivered it to pieces. The hero of this story returned to the mines in the following spring without a cent, and was working as a common laborer at the time of our visit. A freak of one of the most successful Californians may be appended as a companion to the story just related. When in the hight of his glory, he was in the habit of substituting champagne bottles—full ones, too—for the wooden pins in the bowling alley, smashing batch after batch with infinite satisfaction to himself, amid the applause of his companions and the "bar-keeper."—*The Northwest Passage by Land. By Viscount Milton and Dr. W. B. Cheadle.*

Detection of Fire-damp.

A very ingenious and simple instrument has been invented by Mr. Ansell, of the British Mint. Its action depends on that tendency which exists in gases and vapors passing themselves through each other, notwithstanding the interposition of membranes and porous substances, which is called *endosmose* and *exosmose*, and it consists of a small brass cylinder, one inch and a half long and three-quarters of an inch in diameter within, and of a piston working freely in this. Under the piston, and within the cylinder, is a spring, which, when pressed by the sinking of the piston into the cylinder, moves a hand on a dial on the outer case, the back of which is of thick porous earthenware, and its appearance somewhat resembles an aneroid barometer. When this instrument is brought into an atmosphere containing coal gas, the latter passes through the porous plate with a velocity dependent on its amount; and the air within the case being expanded, the piston is forced into the cylinder to an extent which is indicated on the dial. Taken out of impure air, the effect will be reversed, and the index will move on the dial in the opposite direction, the amount of purity or contamination being exactly indicated. It is clear that the instrument might easily be made to set a bell ringing, or give some other notice of danger from the presence of an explosive atmosphere. So far as trials of it have been made, it seems to work satisfactorily.

Rapid Sawing.

Messrs. Jackson, Carrier & Co., of Pittsburgh, own a saw mill at Brookville that does wonderful work. The sawyer cut in twelve hours, one day recently, 44,325 feet of good marketable boards. The machinery of this extraordinary mill was manufactured in Brookville. The engine is a sixty-horse power, weighing three tuns, with a fourteen-inch cylinder, resting on a cast-iron bed-frame. Length of stroke twenty inches, with a ten-foot driving wheel, upon which, on this occasion, but two-thirds of the maximum power of the engine was used, causing it to perform one hundred and fifty revolutions per minute, driving the saw at the rate of seven hundred and fifty revolutions per minute. The fuel consisted entirely of green sawdust, and not over one-third of the dust that fell from the saw was used in the furnace. As a general thing, a log that would cut three hundred feet of boards, was put on the carriage, sawed, and the lumber put off the mill in five minutes.—*Boston Commercial Bulletin.*

MAGNESIAN PIPES.—Meerschaum is made on a large scale in New York, says the Boston *Advertiser*, by saturating carbonate of magnesia in silicate of soda or soluble glass—care in selecting a good quality of magnesia being the only requisite for success. The profits are immense, as will be seen. Magnesia costs about twenty-five cents per pound; silicate of soda even less. A pipe made of the "foam of the sea," as smokers verily believe, costs for material about five cents, leaving the balance for labor.

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Improved Hose and Pipe Coupling.

The ordinary coupling which is used to connect lengths of hose and water pipe is very unsatisfactory sometimes, by reason of the threads getting jammed on the end, so that they cannot be entered; or sand or grit sticking between them, so that they bind when half way in, and cannot be moved either way. The coupling is also tedious to attach, for the female screw often binds in the neck where it turns, so that the whole length of hose has to be twisted in order to take it apart or connect it.

The device here shown is a very simple and efficient one for the purpose. There is no screw whatever, and the joint is formed by a cam. This is shown in Fig. 2. In this view, A is the male joint, and B the female. On the first-named there is a small lug, C, projecting, which fits a recess, D; see Fig. 1 also. On the opposite joint there is a cam, E, working in a chamber, F. When this is turned down the body bears on the shoulder, G, and presses it hard down on the leather joint, H, below, making a strong connection and a perfect water-tight joint. By turning the cam up so that the straight side is in line with the opening, the two joints can be separated. All that is necessary is to insert one part within the other, turn the cam down with a key fitted to the square orifice, I, Fig. 1, and the joint is made. The entire patent, city or State rights for sale.

This is a very useful coupling, and was patented through the Scientific American Patent Agency, on June 5, 1865, by A. E. Barnard; for further information address him at the C. C. Forge, Cleveland, Ohio.

Fig. 1

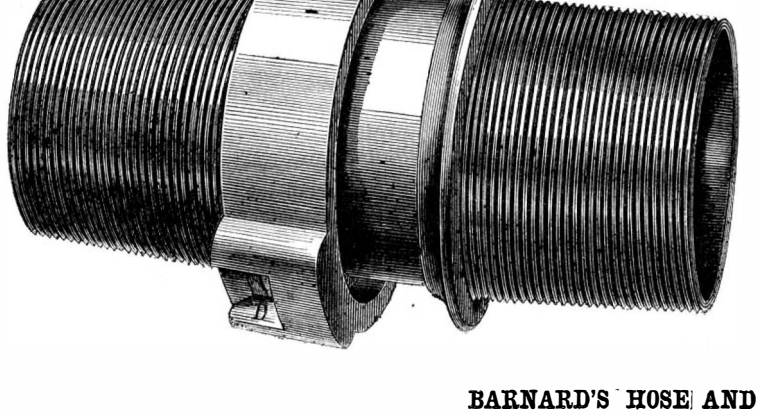
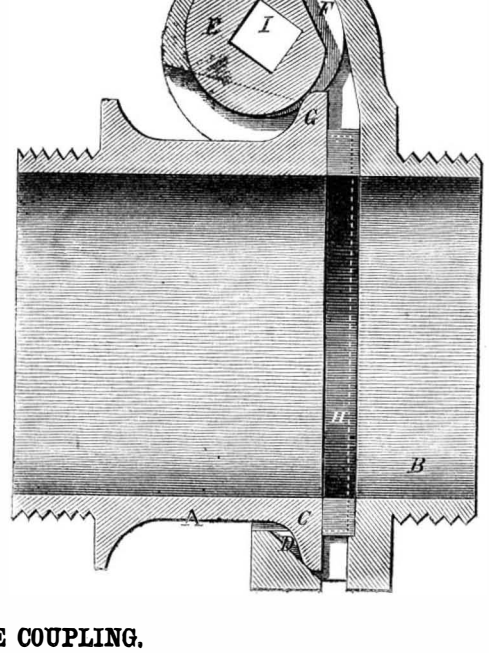


Fig. 2



BARNARD'S HOSE AND PIPE COUPLING.

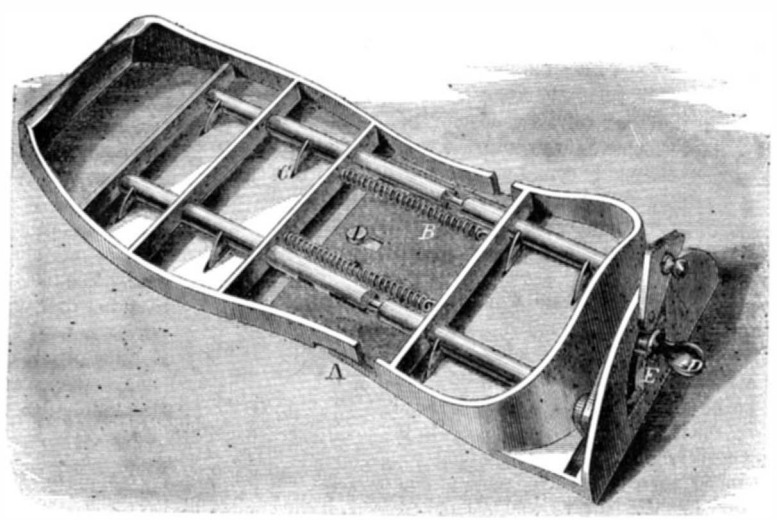
Improved Ice Sandal.

Those who walk on slippery places know how uncertain the footing is; and many a one who strolled along in thoughtless security, has found to his sorrow that ice is treacherous, and that sleety sidewalks, or paths full of snow hummocks, betray the unwary feet.

This ice sandal is intended to make walking on ice as easy and safe as walking on gravel, and it will do the thing perfectly. In detail, it is a sandal made of sheet metal, and shaped to the foot. It is jointed and rebated in the middle, as at A, so as to be capable of extension without dislocation; a spring, B, serving to keep the two pieces together. In the bottom of this sandal there are holes through which steel points, C, project, in shape like the fleam used for bleeding horses. These points penetrate the ice and prevent the feet from slipping, as before spoken of. At the heel, or back of the sandal, there is a knob, D, fastened to the shaft the steel points are on.

By moving this knob through the slot, I, the points can be thrown entirely clear of the ice, so that the sandal can be immediately converted into a plain ordinary surface when the same is needed for walking on the ground. By extending the sole a variation in the size can be made so that the same pair of sandals will serve for different members of a family.

The utility of this invention, to those who have use for it, appears at once. It was patented through the Scientific American Patent Agency on March 28, 1865, by Edward Fitzki, whom address for further information at No. 271 Pennsylvania avenue, Washington, D. C.



FITZKI'S ICE SANDAL.

A Novel Locomotive.

Mr. E. N. Dickerson has lately adapted his boiler to a locomotive engine with cylinders of unusual size and stroke.

The following particulars are derived from the *World*:—

The Providence Steam Engine Company are building for the Erie Railway a new locomotive, with Dickerson's boiler, which is a novel piece of workmanship and arrangement. The engine driver is placed forward of the boiler, directly over the spot where the smoke chimney of the engines now in use is placed. The fireman will retain his station behind the boiler. The boiler, being of an entirely different form from those in use at the present time, will enable the locomotive water tank and coal box to be in one continuous frame, so that there will be no tender. The cylinders will be twenty inches in diameter, with twenty-six inches stroke of piston. The valve motion and cut-off will be on a new plan. Great things are expected of this new arrangement, and certainly in these days of railroad accidents it seems right and proper that the engine driver should be so placed as to receive the first fruits of his negligence. This Company are also engaged in building a number of portable engines. This shop is one of the best arranged in the country, and turns out some exceedingly fine work. They propose to build a new boiler shop at an early day.

A Remarkable Coin.

Mr. C. R. Brown, a jeweler at Saratoga Springs, has a very remarkable gold coin, about the size of a half eagle, for which he has been offered $1,200. He values it at the modest sum of $2,000. It is a remarkably fresh-looking coin, but is no doubt a genuine one of the time stated by the Rev. W. W. Eddy, missionary in Assyria, who thus describes how he became possessed of it. Mr. Brown informs us that persons interested in numismatics often come great distances to see his wonderful coin:—

"A coin of Phillip II. of Macedon, father of Alexander the Great, who reigned about 340 years before Christ, and consequently is 2,200 years old, was found in the garden adjoining Sidon, Syria, among the ruins of the ancient city. Two jars containing coins of Phillip and Alexander were found in the ground by workmen digging, and the contents divided among them. The Turkish Government claim all such treasures, and, hearing of the discovery, imprisoned the workmen until they gave up nearly all the coins. These they immediately melted up for new coinage. A Mohammedan woman who was with the workmen obtained some of the coins, and wearied out the Government by her endurance of imprisonment, while denying the possession of any of the treasures. After her release, I obtained this coin with much difficulty from her, through her fear of another arrest.

"W. W. Eddy,
"Missionary in Assyria."

Breech-loaders for the French Infantry.—The Paris correspondent of the London *Daily News*, writing from the camp at Chalons, says:—"I have just seen the new breech-loading rifle which has been decided upon as the future fire-arm of the French infantry. It is an admirable weapon. The bore is about the same as our Enfield. The breech is opened by the most simple method and I should say was next to impossible to get out of order. The barrel is pulled away as it were from the person who holds it, and pulled back in an instant. It can be loaded and fired with the greatest ease—from 31 to 33 shots in a minute. The bayonet it is to have will be the sword bayonet, the same as now used by the Chasseurs à Pied and the Zouaves.

A man in England walked 8 miles in 68 minutes and 40 seconds.

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OUR CIRCULATION.

We have had no doubt, for a long time, that the circulation of the SCIENTIFIC AMERICAN was far in advance of that of any other paper of its class, either in this country or in Europe; and some information that we have recently received in regard to the numbers printed of the leading publications abroad, has led us to the conclusion that the circulation of this paper surpasses that of all the other mechanic and scientific periodicals of the world combined.

EARTH CURRENTS AND THE ATLANTIC CABLE.

If a piece of insulated wire is bent in a coil, and a current of electricity is passed through it, the axis of the coil becomes a magnet and continues so as long as the current is flowing. From this fact it has been supposed that the magnetism of the earth is induced by currents of electricity passing around the globe, this current being excited by the heat of the sun as the earth rotates beneath it.

In the year 1840 a series of very delicate observations on the variations in the magnetism of the earth were commenced at Girard College, Philadelphia, and the results have been the subject of elaborate discussion by Professer Bache in several papers that have been published by the Smithsonian Institution as a part of its contributions. We recently published Professor Bache's conclusions in regard to the more regular variations in the earth's magnetism—those which occur daily and those of the eleven-year period—corresponding with the recurrence of spots on the sun. Beside these, the observations discovered occasional variations of great irregularity and violence, which have been called magnetic storms. It seems that such a storm was prevailing at the time the signals became unintelligible on board the *Great Eastern*, and may have been the only cause of the signals failing. If this was so, the cable was cut, without any necessity, when in perfect condition.

The registering apparatus employed to record variations of magnetism is the most delicate of any instrument known to either mechanic arts or scientific observation. The force is so small that the needle must be suspended to traverse with the greatest possible ease; a pencil rubbing against paper would hold it fast. A thin silver mirror is mounted upon the needle, and upon this is thrown a beam of light which is reflected upon a strip of photographic paper, the apparatus being placed in a dark room where no light other than the reflected beam can reach the paper. The paper is slowly unrolled from one roller and wound upon another by clock-work, the spot of light printing a continuous line as the paper is drawn along. For horizontal variations the paper has, of course, a vertical motion, and for the vertical dip a horizontal motion—the variations giving a zig-zag form to the line.

The English papers publish the following letter, in relation to the recent magnetic storm, from Professor Airy, the Astronomer Royal:—

"ROYAL OBSERVATORY,
"Greenwich, Aug. 5—12 M.

"DEAR SIR:—At the date of my letter yesterday the magnetic storm had somewhat subsided. Very soon, however, there were signs of great activity, and by 11 o'clock of last night (Friday, August 4th), the magnetic storm was sensibly as violent as before, and continued so through all the early morning hours. It has declined a little through the morning, but at the present time (Saturday, August 5, at noon) it is still very active.

"The spontaneous earth currents were not quite so strong in the last twenty-four hours (ending Saturday, August 5, at noon) as in the preceding twenty-four hours (ending Friday, August 4, at noon), but they are still very active. A nearly continuous register is made by the currents on the Dartford wire (which at first were not very strong) to midnight of Friday, August 4; but since that time the traces have been lost, and the currents on the Croydon wire have been very violent; only for a short time, ending about Friday, August 4, at 3 P. M., was the motion sufficiently gentle to have left any record, and then imperfectly. After that time the currents were so violent that the trace is totally lost.

"It is scarce in possibility that a telegraph current can have passed along the Atlantic cable in a legible state during any part of this time. "G. B. AIRY.

"G. SAWARD, Esq."

NYSTROM ON WORK AND POWER.

We have a kindly feeling toward Mr. Nystrom, having received from him several valuable contributions. It has seemed to us, however, that his method of explaining the difference between work and power was calculated rather to confuse than to elucidate the subject. In reply, he forwards us a communication containing his explanation, with a request that we would lay it before our readers and let them judge for themselves. We comply with his request with pleasure, and the communication will be found on another page.

The raising of 1 pound of matter 1 foot in vertical hight is 1 foot-pound of "work." The raising of 33,000 pounds 1 foot is 33,000 foot-pounds of work, whether 1 minute or 100 years be consumed in the operation.

The power—either of a steam engine, waterfall or animal—that can raise 33,000 pounds 1 foot in each minute of time is 1-horse power; the power that can raise 33,000 pounds in half a minute is 2-horse power; and the power that can raise 33,000 pounds in one-tenth of each minute is 10-horse power.

Morin and other writers, therefore, say that the idea of work is independent of time, but that time is an element in the measure of power. It seems to us that these writers are correct. It seems to us, also, that the matter is extremely plain and simple.

Mr. Nystrom, on the other hand—while accepting, if we understand him, the above illustrations of both work and power—denies that work is independent of time, or that time is an element of power, and asserts that the subject is not generally understood, even by educated engineers. We have criticised his arguments upon it as calculated rather to confuse than elucidate it; from this criticism he wishes to appeal to the judgment of our readers—an appeal in which we cheerfully concur.

THE WAY TO PREVENT RAILROAD ACCIDENTS.

There is only one chief cause of railroad accidents, that is—carelessness. There are railroads in the country that have been in operation many years, and that never have had an accident. Can there be any doubt about the reason for this exemption? It is due to one thing, and one only—thorough and energetic care on the part of the managers. The properties of iron, wood and steam are constant; the universe is governed by fixed laws; the same care in the management of other roads would result in the same safety.

The manifest means for securing this thorough care in the management of all roads are to make it for the interest of managers to be careful. The principal cause of carelessness is a desire to save money. Incompetent superintendents are hired at low salaries; repairs are postponed or imperfectly performed, and risks of accidents are encountered rather than the expense to prevent them.

Now, our railroad directors are not usually men who delight in useless slaughter, like Champ Ferguson or Captain Wirz. If it were just as cheap, they would usually prefer to carry their passengers through in safety, rather than to tumble them down an embankment or pitch them into a river.

The plain remedy, then, is to make it cheaper for railroad directors to run their trains with safety than it is to run them with the recklessness that now prevails. Let every accident cost the company so much that it will be for their interest to avoid it. Let juries exact heavy damages in all cases of death or injury.

In order that this may be done in the State of New York, a change in the law is necessary. The revised statutes limit the damages that may be recovered in case of actual death by the carelessness of railroad mangers to $5,000. If a lawyer, doctor or broker, with an income of $10,000, is suddenly killed by the carelessness of some opulent railroad company, the widow is offered the pittance of $300 a year. There is not a mechanic in the country who cannot earn two, three or four times this sum. As a first step toward railroad reform let us have a repeal of this absurd law.

TYNDALL AND THE CLIMATE OF CALIFORNIA.

The interior of California is occupied by a great valley, lying between the coast range of mountains and the Sierra Nevada, being some 60 miles in width, from east to west, and 300 in length, from north to south. The climate of this valley is very peculiar; like the rest of California, it has no rain during the summer, but, unlike the coast district, the days are excessively hot, while the nights are remarkably cool. For months together the thermometer ranges in the afternoon from 100° to 109° in the shade, but after about 5 o'clock, it begins to grow cool, and the temperature continues to fall till sunrise. A bowl of butter at sunset will be liquid oil, and at sunrise as hard as if it were imbedded in ice. Another noticeable feature of the climate is the extreme dryness of the atmosphere; lumber is seasoned with wonderful rapidity, and clothes washed and hung upon a line are completely dried in a few minutes.

In a nice laboratory in England a philosopher is engaged in some very abstruse investigations of the nature and action of heat. His apparatus is of wonderful delicacy—his thermometer being so sensitive that the approach of the human hand within three feet of it will vary its indications. With this delicate apparatus, with large knowledge, and with patient labor, the eminent physicist has prosecuted his examination of the subtle and invisible force which was the subject of his investigations. Among other facts, he learned that while heat passes freely through atmospheric air, its course is seriously obstructed by minute quantities of the vapor of water.

What a miracle is civilization! Sitting in our office in New York, by the aid of books and mails, we are able to glance in one direction across the stormy ocean to the laboratory of the philosopher, and in the other across the broad continent to the parched valley of the Sacramento, and to perceive an interesting relation between the two. The discoveries of Tyndall have taught us why it is that the dryness of the California atmosphere causes the days to be hot and the nights cool. The absence of aqueous vapor from the air allows the sun's rays to pour down with undiminished force during the day, and during the night the same cause permits the radiation of heat from the earth to go on with greater rapidity than in the moister air of other climes.

COLT'S factory is to be run twenty hours a day, in consequence of the increased demand for pistols. Many of the orders, it is said, come from Southern negroes.

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THE EXPLOSION OF THE "ARROW'S" BOILERS.

After a long and tedious examination of many witnesses, upon the cause of the recent explosion of the steamboat *Arrow*, the facts so far elicited show that it was the result of carelessness. The boilers were built in 1858, and had been run constantly since then, with but ordinary intermission. It is testified that the material was poor when new. There were two boilers and one safety valve, and a stop valve between the two, so that unless the stop valve was opened the boiler had no insurance against explosion. To open this valve, or to see it opened, was the engineer's duty, and if he neglected it he jeopardized the lives of all on board.

It is given in evidence by Mr. Edward Start, of Jersey City, who was formerly the engineer in charge of this boiler, that if the valve was down there would be no way for the steam to escape but by exploding the boiler. Capt. Charles B. Spencer, formerly an engineer, testified that, in his opinion, the boiler exploded from the carelessness of the engineer; that is, in not opening the stop valve aforesaid. It is easy to make mistakes in commenting upon the evidence of witnesses, but, from the statements of these experts, the cause of the disaster is no mystery, and could have been inferred beforehand.

We have not the slightest respect for the evidence of those who predict all sorts of catastrophes from the hour a boat is launched; we put more faith in the testimony of competent witnesses, and from these it appears that the cause was a neglect of duty—called carelessness—on the part of the engineer.

If any easy-minded person thinks the steamboat *Arrow* is the only one in this condition he is deluded. Of the steamers that ply about this harbor there are numbers unfit to steam an hour, but which do run and carry passengers in an unsafe condition. There are boilers with shells patched; with water bottoms covered all over with soft patches; with flues corroded thin about the flanges. At the hand-hole plates, and at the back of the furnace under the bridge walls, the metal is so thin that one cannot screw up a plate without danger of pulling it through, and yet they run and will continue to do so.

Investigations of explosions serve to show the public what the officers in charge knew long before, and accidents will continue to occur, and lives will yet be sacrificed on the altar of cupidity and carelessness. In the case of these boilers, they were not safe in any event if the engineer forgot to open the stop valve, and the malconstruction was, in reality, the prime cause of the explosion. It is but lately that a set of boilers were demolished in Second avenue from this very cause—a stop valve between two boilers and a safety valve on one boiler only. How many more are there in this condition?

The verdict of the jury, rendered since the above article was written, is:—"We severely censure the owners of the boat for running her with old and imperfect boilers, and also criminally censure the Government Inspectors for the careless manner in which they inspected said boilers, and for giving a certificate for the use of the same."

A righteous verdict.

MARKET FOR THE MONTH.

The country is enjoying a season of unparalleled prosperity. The cotton manufacturers are selling their goods for cash at 100 per cent profit, just as fast as they are made. Not more than half of the machinery is running, however, in consequence of the scarcity of labor, and wages have materially advanced—some girls making two dollars a day at weaving. Under the stimulus of these liberal rates the villages are rapidly filling up, and the amount of machinery in operation is constantly increasing. Dry-goods commission merchants are selling nearly all their goods to arrive for cash; jobbers select their customers and sell either for cash or on thirty days time; in straw goods the trade is being done on the sidewalk—the goods being bought before their arrival and distributed without entering the store; porcelain manufacturers tell us that their ware is ordered ahead of the manufacture; the newspapers were never making so much money before; and, in short, it seems to be a period of general prosperity. There is only one drawback—a nervous anxiety to know what Mr. McCulloch is going to do in reference to the currency.

We give below our usual table, showing the changes in the prices of the leading staples since the beginning of the month.

	Price Aug. 2.	Price Aug. 30
Coal (Anth.) ℔ 2,000 lb	$ 8 50	$9 50 @10 50
Coffee (Java) ℔ lb	25 @ 28	26 @ 26¼
Copper (Am. Ingot) ℔ lb	30 @ 31	30½@ 32
Cotton (middling) ℔ lb	48	44
Flour (State) ℔ bbl	$6 00 @ 7 00	$6 80 @ 9 25
Wheat ℔ bush	1 85 @ 2 30	2 10 @ 2 40
Hay ℔ 100 lb	1 00	60 @ 70
Hemp (Am. drs'd) ℔ tun	255 00@265 00	270 00@300 00
Hides (city slaughter) ℔ lb	9 @ 10	10 @ 10½
India-rubber ℔ lb	48 @ 70	47½@ 70
Lead (Am.) ℔ 100 lb	9 00 @ 9 62½	9 25 @ 9 30
Nails ℔ 100 lb	6 50	5 50 @ 6 00
Petroleum (crude) ℔ gal	32½@ 33	32
Beef (mess) ℔ bbl	$10 00 @14 50	8 00 @14 50
Saltpeter ℔ lb	24	22
Steel (Am. cast) ℔ lb	13 @ 22	13 @ 22
Sugar (brown) ℔ lb	8 @ 16¼	11 @ 16½
Wool (American Saxony fleece) ℔ lb	75 @ 77	75 @ 77
Zinc ℔ lb	12¼@ 13¾	13½@ 13¾
Gold	1 45⅝	1 44
Interest (loans on call)	4 @ 5	4 4

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week; the claims may be found in the official list:—

Device for Reeling Cord.—This invention relates more particularly to an arrangement of mechanical devices to be applied to the handle portion of a fishing pole, either upon its inside or outside, for reeling the line, and consists principally in imparting to the spool or reel upon which the line is wound a reciprocating rectilinear movement, while at the same time it is revolved, whereby the line can be evenly wound, and with dispatch and facility. The operating devices for the spool are also so arranged that, when desired to unreel the line, they can be thrown out of gear, as it were, with the spool, leaving it independent of them, and free to revolve on its axis or shaft. The arrangement of this reeling device is simple and ingenius in many respects, and its operation quite free and accurate; and, for the purpose for which it is especially intended, it possesses many important advantages over the ordinary reeling devices now in common use for fishing poles. William M. Stuart, of New Jersey, is the inventor.

Fire Alarm.—This invention relates to an apparatus the operation of which is based upon the expansion and contraction of a spring composed of two different metals or other materials. The outer end of this spring is connected to an elbow lever, which is secured to a vertical arbor bearing an index, which traverses over an adjustable scale, and when the temperature rises beyond the desired point, said index, by coming in contact with the end of a lever, releases a tilting weight, and, by the action of this tilting weight, another similar weight is released, and thereby the escapement of a clock movement is freed, and said movement being driven by a weight or spring, causes a hammer to strike repeated and rapid blows on a bell, so that the attention of persons in the room, building or other structure is called to the fact that the temperature has reached its maximum. The scale and spring are situated on a common bed-plate, and by adjusting this bed-plate the point, when the alarm is released, can be adjusted at pleasure. Charles Dion, Montreal, Canada, is the inventor.

The Latest Yankee Experiment in Naval Architecture.

In a few weeks more another eccentric ship, even for this most eccentric ship-building age, will be afloat upon the Thames. We have jointed ships, unsinkable ships, ships of seven inches of iron, and the *Great Eastern*. Now, again, we are promised another addition to the motley fleet, and yet another improvement, in the launch of the cigar ship.

The vessel is of wrought iron, and is being built as the private yacht of an American gentleman—Mr. Winans—who, as we have said, has designed everything connected with the ship. The execution was at first entrusted to Mr. Hepworth, and he expended upon it the most perfect workmanship of which wrought iron is capable. The hull, as the hull of a ship, looks one of the most extraordinary things it is possible to imagine. It is immensely long, perfectly round, resembling the shape of a cigar, being, however, finely pointed at both ends, instead of, as in a cigar, only one. The form is so at variance with all our generally received notions of nautical beauty that we can only stare at it in mute astonishment, though there is something in its long, tapering lines so suggestive of immense speed that one is almost ashamed that no one ever suggested such an idea before. In justice, however, to our own time, it must be said that such a vessel could only be built at a period when iron ships were in use and iron ship-building had reached its highest state of development. Looking at her now, she appears to be little more than a gigantic iron mainyard for some vessel of the *Great Eastern* class, having a rather wide diameter in the middle, and tapered at each end to a point almost as fine as that of a needle. Her boilers, like all the other parts of the vessel, are on a new plan. Four of them are on the locomotive principle, with vertical tubes. A blast fan is to give them draught, and they are to work at one hundred and fifty pounds pressure. This is a great power, but, as the boilers are built far stronger than even locomotive boilers, it is asserted that they could be worked up to one thousand pounds, or even one thousand one hundred pounds per square inch, with safety. There are one hundred and thirty-six feet of fine bar surface, and it is expected that, with the aid of the blast fan, each of these one hundred and thirty-six feet can be made to burn fifty pounds of coal per hour. If the furnaces can accomplish this, then, according to the rule which gives one nominal horse power for every two and a half pounds of coal consumed per hour, Mr. Winans's yacht will be working at nearly two thousand five hundred horse power. In our best mail steamships, on their fastest trips, it is found difficult to burn thirty pounds of coal per foot of fire bar surface per hour. If Mr. Winans, then, burn fifty pounds, he will be working up to nearly two thousand five hundred horse power, or at the rate of eight indicated horse power to every tun burden of his vessel. In very fast ocean-going steamers the ratio of horse power to tunnage is only about two and a half tuns to one nominal horse power. The advantage which the cigar ship possesses in this respect, together with those which her slender form, smooth surface and very small midship section (only one hundred feet) will give, should enable her to go at an extraordinary speed. It is said that, as regards motion at sea, rolling and pitching will be reduced to a minimum, and certainly her form seems to suggest that such a result will very probably be effected. With very small masts, and all her weights well below the water line, she is not likely to roll. But if she does not pitch, but cuts through the water, she will "take it in over all," and in that case, with her upper deck so near the sea, we should fancy that it would be swept fore and aft. The extreme length of the vessel over all is two hundred and fifty-six feet, and her greatest width and depth is, of course, amidships, where the circle is sixteen feet diameter. Thus, then, her length is no less than sixteen times that of her greatest width, ordinary vessels being thought very narrow if their width is only one-seventh of their length.—*London Times.*

[This is the second cigar-shaped vessel built by the Messrs. Winans; the first was constructed in Baltimore, in 1858, and was illustrated on page 65, Vol. XIV. (old series) Scientific American. We there gave our reasons, at great length, for the opinion that it would not succeed, and we have seen nothing since to change our opinion. If the vessel were designed to be wholly submerged, the model would be excellent, but as it is to float upon the surface, the model of the submerged portion is about as poor as can be conceived.—Eds.

Pit Hole and its Name.—Pit Hole, an oil well in Pennsylvania, was thus named in consequence of an extraordinary pit or cavern that exists about three miles from the city. In this pit stones are thrown, but they are never heard drop. Its depth has not as yet been fathomed. The whole country between there and Plumer is believed to be cavernous.

Level of the Dead Sea.—An expedition sent out from England last September, under Captain Wilson, R. E., claims to have settled the question accurately, and reports that the Dead Sea, in the time of flood, is 1,289½ feet, and in summer 1,298 feet, lower than the Mediterranean.

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MISCELLANEOUS SUMMARY.

NEW carriages of a luxurious kind are about to be placed on the Nicholas Railway between St. Petersburg and Moscow. In addition to a handsomely furnished saloon and smoking chamber, each carriage comprises a series of smaller apartments opening on both sides of a corridor. The sofas, ottomans and cushions of the daytime are at night converted into beds, mattresses, pillows, etc., so that the passengers can sleep with all the comforts of home. These improvements are not confined to the first-class carriages, but are extended to those of the second and third class. Our railway directors and managers would do well to follow this example. Of course, a slight additional charge is made to passengers using these conveniences.

FRENCH SILKS.—The French silk manufacturers have suffered severely from the American war. The silk exports to the United States, in 1860, from France were 103 millions. In 1863 it fell to 23 millions. During this interval of three years the exports from France to the United States fell from 250 millions to 94; and North American produce imports into France for French consumption suffered to the same extent. Instead of 240 millions in 1860, which, owing to the rise in the price of cotton, reached 363 millions in 1861, it fell in 1863, to 81. This reduction applies especially to raw cotton.

THE Wisconsin State Agricultural Society will hold its twelfth annual exhibition at Camp Tredway, in the city of Janesville, from September 25 to 29, 1865. The programme includes first-class trials of speed of trotting, pacing and running horses; superior trials of machinery; equestrianism; evening discussions of practical questions by the ablest men in the West; presentation of the prize banner to the county that shall make the best exhibition at the State Fair; and annual addresses by Major-General W. T. Sherman, Hon. H. S. Randall, LL.D., of New York, and other distinguished speakers.

THE railway over Mont Cenis is to be worked, as is pretty well known, by means of a third rail, on which the driving wheels of the engine will run horizontally. The credit of the invention is assumed by the engineer of the line, Baron Sequ'ni. Mr. Vignoles, the English engineer, now steps forward to claim it as the infraction of a patent obtained by himself and Capt. Ericsson in 1830-31. The authenticity of the claim is avouched by Sir Charles Fox, who incloses Mr. Vignoles's letter to the *Times*.

THE following statement gives an idea of the cost of keeping Paris clean:—The sweeping of the macadamized roads costs £33,680 a year; the cleaning of the paved ways £91,000, of which £3,120 goes for materials, £20,400 for carting away the dirt, and the rest in paying the sweepers, who consist of women as well as men. The expenses of management and superintendence are £10,400. Total expenditure, £135,080—$675,000.

A PEPPERMINT PLANTATION.—At Ada and Lyons, Mich., Mr. Van Auken is extensively engaged in growing peppermint for distillation. He has nearly two hundred acres growing in the two counties. This is an easily-grown and highly remunerative product, giving four crops from one planting of roots. The one hundred acres devoted to this crop, last year, gave a net profit of $5,000.

MANUFACTORY OF LUBRICATING OILS.—The firm of Morehouse, Merriam & Co., of Cleveland, Ohio, manufacturers of compound lubricating oils, now turn out from their factory from four to five thousand gallons a day, and have capacity, if pressed with orders, to produce double that amount. They give employment to about fifty hands. Large quantities of these oils are shipped to Boston.

THE borers through Mont Cenis have come across a stratum of quartz that tests the power of machinery and compressed air to the utmost. Not more than a meter a day can be worked, and the stratum is four hundred meters in thickness, which will considerably increase the time necessary to finish the road.

THE Union Copper Mine, at Copperopolis, during the month of June; shipped from the mine to San Francisco, via Stockton, the large amount of three thousand six hundred tuns of ore, the freight money on which was $29,000.

ISSUED FROM THE UNITED STATES PATENT-OFFICE

FOR THE WEEK ENDING AUGUST 29, 1865.

Reported Officially for the Scientific American.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

49,600.—Carpet Fastening.—G. W. Andrews and J. P. Burnham, Chicago, Ill.:

We claim, as a new article of manufacture, the carpet fastening, B, made by bending a single piece of wire, with eyes, a a, hooks, b b, and a bracing stay, c, in the manner herein described.

49,601.—Corn Planter.—G. J. Bergen, Galesburg, Ill.:

First, I claim the plate, B, provided with the ears, a a, and lugs, b1 b, as and for the purpose set forth.

Second, I claim securing the hopper, A, by means of the hinge joint at its front, and brace, d, constructed and operating substantially as and for the purpose set forth.

Third, I claim the seed slide, C, provided with the inclined flat groove, o, as herein shown and described

Fourth, I claim making the post, E, with the detachable piece, h, as and for the purpose set forth.

49,602.—Liquid Ejector.—Abel Brear, Saugatuck, Conn.:

I claim the ejector, consisting of a single curved or bent tube, A, having an unobstructed passage, and external nozzle, a, for the admission of steam or other aeriform fluid, communicating with the said passage on its back or outer curved side, at a point directly opposite to, and in line with, the outlet or discharge opening, b, substantially as and for the purpose herein specified.

49,603.—Water Ejector.—N. S. Chappell, New York City:

I claim the movable or reversable shaft, F, having an attached nozzle, G, or outlet, in combination with an ejector, substantially as and for the purpose herein specified.

49,604.—Building for Preserving Milk, Fruit, Etc.—N. W. Clark, Detroit, Mich.:

I claim the arrangement and construction of the building, with its apparatus, E G H R U and W, as herein described and for the purposes set forth.

Second, I also claim the arrangement of the devices, R N S W and U, so as to be operated in the one apartment, J, without affecting the temperature of the adjoining apartment, D.

Third, I also claim the mode of preserving the ice, and saving all the drippings, by conveying the cold water from the melting ice by means of pipes through a series of rooms to one or more reservoirs or tanks.

Fourth, I claim the shape and construction of the faucet, U, arranged and combined with the head, W, and valve, T, as herein described and for the purposes set forth.

Fifth, I also claim keeping the sawdust undisturbed by means of tubes, P P P, in the partition walls, so that the crank, N, handle, S, and faucet, U, may be opened or removed without opening the apartment, D.

49,605.—Tent Frame.—Wm. H. Clark, Cincinnati, Ohio:

I claim the combination of the shaft, G, with the hinged legs, A, sleeve, C, and rods, I, when constructed and applied as herein described, so that in the extended condition of the frame the said shaft will extend above the frame for the attachment of guys.

49,606.—Machine for Scouring Leather.—W. M. Clarke, Butternutts, N. Y.:

First, I claim the frame, A, as constructed, in combination with the rotary table, B, carriages, C and B, substantially in the manner and for the purpose set forth.

Second, The carriages, B and C, operating substantially in the manner and for the purpose set forth.

Third, The ropes, R, pulleys, F, and crank shaft, N, operating the carriages, substantially in the manner and for the purpose set forth.

Fourth, The rotary table, D, in combination with the carriages, substantially in the manner and for the purpose set forth.

Fifth, The rubber arm, I2, whiffletree, H, lever, F, connecting rod, G, spring, L, and friction roller, T, with connecting rod attached, the whole combined and operating substantially in the manner and for the purpose herein set forth.

49,607.—Harvester.—Wm. Cogswell, Ottowa, Ill.:

I claim the flanged gudgeon, which is adjustably supported on the reel post, and sustains the reel with an extended bearing longitudinally, substantially as described.

49,608.—Harvester.—Wm. Cogswell, Ottowa, Ill.:

First, I claim attaching the cutter bar, and through it the platform, to the frame by the pivotal connection and draught rod, at diagonally opposite corners of the frame, as represented, so that by the breaking or detaching of the latter the platform wheels around and tows behind.

Second, The method of connecting the bridge piece, L, to the frame by means of a pillar pivoted in holders, N O, and the box, P, which is adjustable vertically on said pillar, substantially as and for the purpose escribed.

Third, The cap piece, T, in its three-fold character, as a portion of the journal bearing the circle for the lever and the holder, for the upper end of the pillar, M, substantially as herein set forth.

49,609.—Machine for Making Sheep Labels.—C.H. Dana, West Lebanon, N. H.:

I claim a machine for making labels for sheep, in which the several operations of numbering, lettering, cutting-off and bending the metal strip, are performed by means of dies, cutting formers and jaws constructed and operating substantially as described.

I also claim the wheels, d d d2, in connection with the pawl, e, for numbering the metal strip, constructed and operating substantially as described.

49,610.—Rotary Engine.—Seth M. Davis, Rushville, Mo.:

I claim two pistons, P P, in combination with the steam pipes, n n, and the steam ports, e e e e, of the steam chest, D, when constructed as described and set forth.

49,611.—Carriage Top.—L. Z. Dodds and Robert Walsh, Three Rivers, Mich.:

First, We claim the combination of the top with the seat of the carriage, in the manner described, for the purpose set forth.

Second, Fastening the top to the seat of the carriage, substantially in the manner described, for the purpose set forth.

Third, The skeleton frame, constructed as described, for the purpose set forth.

49,612.—Apparatus for Mounting and Printing Photographic Cards.—G. W. Doty, Lockport, N. Y.:

First, I claim the mounting and printing photographic cards at one continuous operation, as and by the means substantially as described.

Second, I claim the construction and arrangement of the sections, B and C, jointed or hinged together, in combination with the plate, D, or its equivalent, as and for the purpose set forth.

Third, I claim the printing silk, H, type, c, and cap, H', arranged and operating in combination with the sections, B and C, or their equivalents, as and for the purpose set forth.

49,613.—Lamp.—John P. Driver, Marengo, Iowa:

First, I claim the base, E F G H, made hollow and air tight as a reservoir.

Second, The supply pipe, I J, for the double purpose of letting the oil into the reservoir, and also of transmitting it to the lamp fountain, A B C D.

Third, I claim the thumb bellows, P Q R S, of india-rubber with the aperture, P, the slit, S, elastic flap, V, with a spiral spring to strengthen said flap, in place or not, as may be best, and the air chamber, N O, as set forth.

Fourth, I claim the hollow handle, L K H, to answer the double purpose of a handle and air pipe, to transmit the air from the bellows to the reservoir. In lieu of said thumb bellows an ordinary short india-rubber tube, with a mouthpiece, may be used to force the air into the reservoir.

Fifth, I claim the combination of the fount, A B C D, the reservoir, E F G H, the supply pipe, I J, the elastic india-rubber ball, P Q S R, with the aperture, P, the slit, S, and the valve, V, the air chamber, N O, with a spiral spring to hold said valve in its place, or other equivalents; the air pipe, L K H, connecting with the reservoir, E F G H, the support, D M, the whole arranged and operating substantially as herein specified.

49,614.—Anti-friction Wheels for Belt Gearing.—David Eldridge, Philadelphia, Pa. Antedated Aug. 13, 1865:

I claim the arrangement of an anti-friction wheel or wheels between the driving and driven pulleys, or between the journals of their shafts, so that the periphery of the wheel or wheels shall have a continuous rolling motion on the peripheries of the said pulleys or journals, as the case may be, substantially in the manner described and for the purpose set forth.

49,615.—Gate.—S. L. Fisher, Brimfield, Ill.:

I claim the construction of the wing paddle, A, forming the top of the gate, and projecting beyond the end of the gate, in combination with the ropes, C, when arranged and combined as herein described and for the purposes set forth.

49,616.—Punch.—M. J. Fitzpatrick and Benjamin Barker, New York City:

We claim, First, The bands surrounding the worm screwshaft, and connected to the eccentric boxer in the combination, as and for the purpose specified.

Second, We claim the combination of the worm screw and wheel, the flattened main screw, the eccentric and main stock, substantially as and for the purpose set forth.

49,617.—Inkstand.—B. S. Fletcher, Cornish, N. H.:

I claim the combination of the bottle, C, the spring, D, and the guard, F, all arranged in the case, A, substantially as described and for the purpose set forth.

49,618.—Converting Reciprocating into Rotary Motion.—J. F. Foss, Lowell, Mass. Antedated Aug. 28, 1865:

I claim the construction of the sliding frame, C C, the combination, arrangement and operation of the said frame, C C, and the crank, D D, with the shaft, L, substantially as herein specified and for the purpose herein set forth

49,619.—Damper for Stovepipes.—Joseph Fowler, Watertown, Wis.:

I claim, First, A series of divided disks, hinged, and formed alternately of larger and smaller size, the larger disks having openings near their centers, the whole forming a damper, as set forth.

Second, I claim the triangular flanges, o o, in combination with the hinged half disks, for the purposes and as specified.

Third, I claim the cam pieces, I I, on the damper rod, h, in combination with divided hinged damper disks, for the purposes and as specified.

49,620.—Newspaper File.—Jacob Frick, Philadelphia, Pa.:

I claim, First, The strips, A and B, combined with the plates, C and C', and with the springs, a, or their equivalent, substantially as and for the purpose specified.

Second, The plates, A and B, one having a projection on its edge and the other a recess in the edge adjacent to the said projection, for the purpose specified.

Third, The strips, A and B, having strips of cloth, rubber or other elastic material secured to their inner edges, for the purpose specified

49,621.—Horse Hay-fork.—D. M. Garrett, Shelby, Ohio:

I claim the arms, A' and B', curved laterally, as shown and described, for the purpose of dispensing with the wooden heads, in combination with wheel, b, hook, J, link, F, and lever, L, when said parts are connected and arranged as herein shown and described.

49,622.—Fire Screen.—H. P. Gengembre, Pittsburgh, Pa.:

I claim the sliding screen or screens, S S, the slotted arm, T, and disk, H, the whole arranged and operating as and for the purpose specified.

49,623.—Steam Gage Cock.—Victor Giroud, New York City:

I claim the arrangement of the way, a'', as herein described, in relation to the way, a', in the plug of the cock, for the purpose herein set forth.

49,624.—Globe Oil Cup.—Victor Giroud, New York City:

I claim the plug, D, with ways or ports, I J K L and M, in combination with the inner shell, C, with ways, F G G2 and H, the globe, A2, and receiver, B, the whole arranged and operating substantially in the manner herein described, for the purposes set forth.

49,625.—Cylinders of Wool-burring and Similar Machines.—C. L. Goddard, New York City:

I claim the manner of constructing the inner cylinder of burring machines of metal strips and wood combined, on a metal shaft, substantially as and for the purpose specified

49,626.—Grain Dryer.—Robert Heneage, Buffalo, N. Y.:

I claim the arrangement of the perforated discs, C, provided with the cones, C', and secured seriately upon the shaft, B, with the conical perforated hoppers, D, for the purpose of distributing the grain to and from the centre of the machine, the several parts being constructed in the manner specified

49,627.—Button-hole Sewing Machine.—D. W. G. Humphrey, Chelsea, Mass.:

I claim the feeding gage, in combination with the ratchet hand or pawl, and the feeding ring which operates the clamp that holds the cloth, substantially as and for the purpose specified.

I also claim the adjustable cam plate which regulates the range of feeding motion for spacing the stitching in working the eyelet, in combination with the ratchet hand or pawl, and the feeding ring which operates the clamp that carries the cloth, substantially as and for the purpose specified.

I also claim the adjustable cam plate which regulates the range of feeding motion for spacing the stitches along the straight parts of the button-hole, in combination with the ratchet hand or pawl, the feeding ring and the adjustable cam plate for adjusting the range of the feeding motion in working the eyelet, substantially as and for the purpose specified.

I also claim the auxiliary spring which acts on the ratchet hand or pawl only at the time it is required to act on the ratchet teeth, in combination with the ratchet hand or pawl, the feeding ring and the feeding gage, substantially as and for the purpose specified.

I also claim connecting the loop carrier and the under thread carrier with each other to be operated together, and by the same means, substantially as and for the purpose specified.

I also claim uniting two loop openers for opening the loop of the needle thread and the loop of the under thread, substantially as described, so that they shall be operated by the same means, as described.

And I also claim each of the loop openers, in combination with each of the oblique sides of the aperture in the plate below that part of the table on which the stitching is effected, substantially as and for the purpose specified.

49,628.—Extractor of Tubes, Drills, Etc., from Oil Wells.—William R. Hinsdale, Brooklyn, N. Y.:

I claim the cylinder, A, to which the bar, B, is attached at one side, so as to afford no obstruction to the passages of the rod to be raised, through the said cylinder to any desired extent, and which is constructed sharp edged at the lower end, as described, in combination with the spring, C, the top of which is nearly on a level with the top of the said cylinder, for the purpose specified, all arranged in the manner herein set forth.

49,629.—Flour Bolt.—James E. Huston, Hillsdale, Mich.:

I claim, First, The barrier, F, consisting of the parallel wires stretched between the ribs of the bolter frame, substantially as de-

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scribed, and interposed between the inlet aperture for the chop and and the bolting surface on the ribbed frame.

Second, In combination with the said carrier I claim the knocking device, as described.

49,630.—Cattle Tie.—James Ives, Mount Carmel, Conn.:

I claim, First, Providing for shortening the snap, or closing tongue of a snap hook, by applying the spring, which operates to keep the tongue in place against the end of the hook, in rear of the pivot connection of said tongue, substantially as described.

Second, Adapting the rear extension of the lever tongue. D, to receive and retain in place a spring which is located in rear of the fulcrum of said tongue, substantially as described.

Third, Constructing the fastening rings, E E', and applying them to the halter rope, substantially as described.

49,631.—Cheese Curd Cutter.—Hiram Keeney, Potter Centre, N. Y.:

I claim, First, The vat, A, Figs. 1, 2 and 3, in combination with the racks, B B, pinions, C C, and rollers, D D.

Second, I claim so arranging the racks, B B, pinions, C C, and rollers, D D, in combination with shaft, E, and crank, g, as to give the knives, F F, a revolving motion from the bottom of the vat upward, through the curd, always in the direction of the advance motion of the shaft E, when turned by crank, g.

Third, I claim the revolving knives for the purpose of cutting curds in the process of making cheese, substantially as and for the purpose set forth.

49,632.—Window Shutter.—William H. Kennard, Jr., Baltimore, Md.:

I claim the shutter provided with a hinged panel, as herein described, as an article of manufacture.

49,633.—Joint for Ligtning Rods.—L. King, East, Cleveland, Ohio:

I claim the connection of branch pipes or rods by means of the pin, g, head, c, and collar, f, with the dowel, d, or their equivalents, substantially as described.

49,634.—Curtain Knob.—Calvin Z. Kroh, Tiffin, Ohio:

I claim the new article of manufacture, as herein described, consisting of the screw, e, flange, d, square or angular enlargement, c, neck, b, and head, a, all united together for the purpose set forth.

49,635.—Wash-board.—John S. Lash, Philadelphia, Pa.:

I claim, in combination with a series of rollers of the form herein described, and arranged in relation to each other as set forth, a rubbing board having longitudinal and transverse grooves in or on its face, and acting with said rollers, as herein described and represented.

49,636.—Device for Holding Sheep while being Sheared.—Miles K. and Lyman P. Lewis, Iowa City, Iowa:

We claim a revolving seat, made concave or otherwise, for the purpose of holding and turning sheep while they are being shorn of their wool.

And in combination with the above-claimed seat, we claim a back or rack, made arched, curved, or otherwise, to support the sheep on its rump, and provided with a device to hold said rack, more or less inclined, or otherwise.

We also claim mounting said seat and rack on a rotating platform, so that it may be turned by the shearer to adapt it to the air, light, or other circumstances.

49,637.—Process for Treating Ore.—Simon F. Mackie New York City:

I claim the within-described mode of obtaining a rich gold residue from ores of gold, by treating the ores by roasting and fusing, and subjecting the roast to the action of acids, substantially as described.

Also, Removing the baser metals and other matters from the roasted matter, and leaving a rich gold residue, by subjecting the roasted matter to the action of acids, substantially as described.

49,638.—Bolt Machine.—Aaron Marcellus, Rockport, Ill.:

I claim the combination of a pair of double-recessed dies, one or both of which vibrate with a reciprocating die working between them, and with tongs, constructed substantially as described, and arranged and operating substantially as and for the purpose set forth.

49,639.—Book Stand or Holder.—William W. Marston, New York City:

First, I claim the socket, f, in combination with the arm, h, set on a gudgeon, and with the standard, b, the parts being constructed and employed substantially as specified.

Second, I claim the segment, i, in combination with the arm, h, and standard, b, substantially as and for the purposes specified.

49,640.—Pump.—Reuben A. McCauley, Baltimore, Md.:

First, I claim the compound adjustable piston, G, constructed and operating substantially as described, for the purpose set forth.

Second, The combination with piston, G, of sliding valve, V

Third, The nut, N, on the lower end of the piston, G, constructed substantially as described, and arranged in relation to and operating to unscrew and lift the valve seat, X, and the reverse.

Fourth, The ring, r, as arranged in relation to the valve seat, and the piston and its rod, substantially as shown and described.

Fifth, The basket handle, h', of the valve seat, X, having a slot, s, in the same, for the purpose set forth.

49,641.—Cider Mill.—W. E. McDowell and Charles M. Baechtel, Hagerstown, Md.:

I claim the above-described arrangement of screw cone, provided with notches in the thread of the screw, and with the spikes, f, in combination with the box, E, and teeth, e, substantially in the manner and for the purposes set forth.

49,642.—Spading Machine.—William R. Mears, Grafton, Ill.:

First, I claim the combination of a series of pivoted revolving spade shafts or rollers, b, and attached spades, d, with a pair of supporting wheels, g g, when the journals of said rollers, b, are confined in fixed and stationary bearings formed in said wheels, substantially in the manner and for the purpose herein set forth.

Second, I claim also, in combination with the spade shafts or rollers, b, rocking in stationary bearings, as described, the outer segmental levers, c c, cam, B, and guide plate, n, all arranged and operating substantially in the manner and for the purpose herein set forth.

Third, I claim the combination of a series of spades, d d, with a bent axle, D, and the supporting wheels, g g, substantially in the manner and for the purpose herein described.

49,643.—Mode of Securing Bobbins in Shuttles.—Stephen C. Mendenhall, Richmond, Ind.:

I claim the bobbin having its head constructed as described, in combination with the wire or rod, C, in the shuttle, all as and for the purpose set forth.

49,644.—Loom.—Stephen C. Mendenhall, Richmond, Ind.:

First, I claim the described arrangement for securing the reed in the lay, consisting of the rebate in the latter and the adjustable strip by which the face of the reed is fitted against the edge of the shuttle race.

Second, I claim the combination of the ratchet wheel, Y, the pawls, v' v'', and the springs, w, as and for the purpose described.

Third, I claim the guide plate, z, on the under side of the shuttle boxes, and forming a support for the strap, y, when it is brought into action to thrust back the picker block to its place.

Fourth, I claim the combination of the cam, h, the pivoted uprights, j, and the treadles, f, as and for the purpose described.

49,645.—Artificial Leg.—Anton Mennel, New York City:

First, I claim the stop, b, in the ankle joint, produced by an extension of the artificial tibia, and applied substantially as and for the purpose set forth.

Second, The arrangement of the pin, m, situated below and somewhat in front of the fulcrum pin, i, of the knee joint, in combination with the spring, j, substantially as and for the purpose described.

49,646.—Churn.—August A. Newman, Sparta, Ill.:

I claim the arrangement for the securing of the rock shaft, D, by means of the pillow block, l, the movable cap, m, secured by the latch, n, each and all operating in the manner and for the purposes herein set forth.

49,647.—Wall Builder and Stump Extractor.—George W. Packer, Jr., Mystic River, Conn.:

First, I claim the within-described combination and arrangement of the pyramidal frame, M M' M'', and curved reaches, E1 E2, with the four wheels and their accessories, substantially as and for the purposes set forth.

Second, I claim the employment of braces, P1 P2, or their equivalents, in combination with the struts, M, etc., and the curved reaches, P', etc., and arranged to be supported on wheels, substantially in the manner described, so that the braces shall aid in maintaining the curvature or arching condition of the reaches by connecting each to the struts above at one or more points, as and for the purpose herein set forth.

Third, I claim the spherical-based rocker, C, having the king bolt, D, connected thereto by a loose joint, as represented, in combination with a trussed frame, M, etc., and with the wheels, substantially as for the purposes herein set forth.

49,648.—Railroad Car.—William Partridge, Philadelphia, Pa.:

First, I claim a hinged fender or guard, when the same is kept in position by a spring, substantially as and for the purposes set forth.

Second, The combination of the supplemental frame with the hinged fender or guard, substantially as and for the purpose set forth.

49,649.—Manufacture of Hoes.—Andrew Patterson, Birmingham, Pa.:

I claim as my invention the improvement in the manufacture of hoes herein described: that is to say, forming the eye and the blade of one sheet of metal, previously rolled to the thickness of the intended blade, the eye being formed by the gradual action of a series of dies so operating on the substance of the said sheet of metal as to compress into the body of the eye a greater quantity of metal than previously lay within its circumference, the complete hoe being thus formed without further forging, substantially as described and set forth.

49,650.—Combined Strainer and Spout.—William Polyblank, Cleveland, Ohio:

I claim the special arrangement of the movable cylinder strainer, C, with the spout or outlet, D, connected to B, Fig. 2, by the screw, E A, the receiving spout being soldered to the vessel, Fig. 2, when operating conjointly as and for the purpose set forth.

49,651.—Securing Linchpins.—Caleb M. Risley, Woodbury, N. J.:

I claim the washer, in combination with the sliding spring and slotted ears, C C, all constructed and arranged as described, substantially as and for the purpose set forth

49,652.—Heater.—Eli C. Robinson, Troy, N. Y. Antedated August 18, 1865:

I claim the annular-formed air-supplying apparatus, B, or its equivalent device, constructed and arranged substantially as hereinbefore described, in combination with the fire or combustion chamber of stoves, in the manner substantially and for the purpose as herein set forth.

49,653.—Nail Machine.—Jacob Russell, Brooklyn, N. Y.:

First, I claim the combination, in a machine for cutting and heading nails, of a pair of cutters having an oscillating motion about an axis perpendicular, or nearly so, with their cutting-edges, a direct forward-feeding device and a pair of reciprocating headers, the whole operating substantially as herein specified.

Second, Two or more pairs of jaws attached to one revolving shaft of a nail-cutting and heading machine, when constructed, arranged and operating, substantially as and for the purpose herein specified.

Third, The revolving and reciprocating headers, applied and operating in combination with the revolving clamps and oscillating cutters, substantially as herein described.

49,654.—Scrap Hook.—Cyrus W. Saladee, Newark, Ohio:

First, I claim the open skeleton frame, A1 A1 A A A, when constructed and operating in the manner and for the purpose shown and described.

Second, I claim spreading the point of the hood, B, so as to form the projecting corners, or their equivalents, X X, in the manner and for the purpose substantially as shown and described.

Third, I claim the indentation, H, or its equivalent, on the bottom side of the point of the hook, B, in combination with the curved end of the spring, S, in the manner and for the purpose substantially as shown and described.

Fourth, I claim the hook, E, on the end of the spring, D, constructed and operating in the manner and for the purpose substantially as described.

Fifth, I claim the slot or hole, F, through the body of the snap, in the manner and for the purpose substantially as shown and described.

Sixth, I claim the shoulders, K and K, or their equivalents, when arranged in combination with the flattened front of the hook, B, and projecting corners, X X, in the manner and for the purpose substantially as shown and described.

49,655.—Snap Hook.—C. W. Saladee, Newark, Ohio:

First, I claim the guard plate, A, when secured to the rear end of the snap, B, and protecting the spring, S, in the manner and for the purpose substantially as shown and described.

Second, I claim riveting the spring, S, to the under side of the guard plate, A, in the manner and for the purposes substantially as shown and described.

49,656.—Door Fastener.—G. W. Sayre, Pisgah, Ohio:

I claim the within-described implement as an article of manufacture.

49,657.—Horseshoe Nail Machine.—H. F. Sehnders, Buffalo, N. Y.:

First, I claim the combination of the triple hammers, C C D, the two first having a simultaneous stroke against each other, and the latter an alternate stroke against the fixed die, H, arranged and operating substantially as set forth.

Second, I also claim the double-beaked cams, b, in combination with the jointed arms, f f, and pressure springs, n n, for actuating the hammers, substantially as set forth.

Third, I also claim the combination of the tripple hammers, C C D, springs, E E E, cams, b, with gear shafts, G G G, chisel, J, and eccentric, l, all arranged and operating substantially as and for the purposes described.

Fourth, I also claim, in combination with the tripple hammers, C C D, and the actuating parts therewith, connected to the forge, B, for heating the rod for each successive nail, arranged substantially as set forth.

Fifth, I also claim the springs, o o, and feeding cam, m, on the shaft, so arranged as to hold the nail rod in position while the nail is being wrought, and to feed it forward to the hammers as each nail is finished, substantially as set forth.

49,658.—Process for Treating Ores.—Henry B. Slidel, Wilmington, Del.:

I claim combining cast-iron turnings, or other cast-iron scrap of sufficiently small size with wrought-iron scrap or turnings to form an aggregated mass, to be formed into bloom by the hammers.

49,659.—Friction Match Composition.—N. B. Shaw and David Shaw, Sanbornton, N. H.:

We claim the new or improved liquid match composition, made of the materials substantially as described.

49,660.—Adjustable Window Stop.—William Shaw, Hudson, N. Y.:

I claim the box or thimble, with the elongated opening or slot, B, inserted into the stop or bead, and through which slot, B, the screw, A, passes into the jamb, whereby the said bead or stop is made adjustable relatively to the sash, in order to maintain the requisite fit or tightness, as described.

49,661.—Combined Seed-planter and Cultivator.—Paul Sinnhold, St. Louis, Mo.:

First, I claim the combination and arrangement of the wheel, A, with the handles, f f, and with the draft cords, h h, the same forming two triangles, whose apexes are in the axis of A, and by the application of power at their bases, f f h h, acting to preserve the correct equilibrium of the entire machine.

Second, I claim the adjustable central joints or bearings of the beams, C C, in combination with a supporting axle, B, or its equivalent, all being constructed and arranged to operate substantially as and for the purposes set forth.

Third, I claim the arrangement and combination of the draft attachments, comprising the adjustable ring nuts, g', adjustable eye bolts, i i, or their equivalents, and the cords, rods or chains, h h, substantially as and for the purposes herien set forth and specified.

49,662.—Boiler Furnace.—Peter Smith, New York City:

I claim the arrangement of the regulating valve, C, in connection with the air-distributor, B, to open by gravitation, and to be closed by a lever, c, and chain, d, or its equivalent, substantially as herein specified.

49,663.—Fishing-line Reel.—Wm. M. Stuart, Newark, N. J.:

First, I claim the arrangement of the mechanical devices herein described for winding a line upon a suitable reel or spool, operating together substantially in the manner and for the purposes set forth.

Second, Connecting and disconnecting the reel from its driving shaft by means of a frame, t2, so constructed and arranged in combination with the spring, k 2, on the reel, as to interlock the catch, g2, or withdraw it from the shaft slot, l, substantially as described and for the purpose specified.

Third, Passing the line or cord through the center of the fishing pole to the reel or spool, for the purpose described.

49,664.—Apparatus for Cooling Sirup, Etc.—F. W. Tilton, Bristol Station, Ill.:

First, I claim the annular vessel, G, supported in the tank, B, at a little distance from the bottom, and arranged relatively to the receiving pipe, b, and to the discharging pipe, C, substantially in the manner and for the purposes herein set forth.

Second, I claim the combination of the annular vessel, G, the tank, B, cold-water induction, b, and eduction, C, with the sirup reservoir, A, and pipes, I and J, and suitable controlling means, i j, substantially as herein specified.

49,665.—Lantern.—Augustus Tufts, Malden, Mass.:

I claim the construction of a lantern, substantially as and for the purpose specified.

49,666.—Steam Cock.—Albert Tyler and G. F. Kendall, Fitchburg, Mass.:

First, We claim the arrangement of the prismatic chamber, k, within the key, C, above the chamber, n, with the head, l, projecting from the valve stem, substantially upon the principle and in the manner hereinbefore set forth.

Second, We also claim the combination of the passage, v, with the chamber, n, and the chamber, k, arranged as described.

49,667.—Cultivator.—H. H. Webster, Claremont, N. H.:

First, I claim the shafts, A, chains, C and D, and cultivator, B, combined and arranged substantially as described and for the purposes specified.

Second, The spring, m, lever, n, and slotted standard, L, when used for the purpose herein set forth, substantially as described.

49,668.—Railroad Switch.—William Wharton, Jr., Philadelphia, Pa.:

I claim the combination of the permanent rails, A and A', of the main track, the rails, B and B', of the turn-out, the movable switch rail, D, and the guide rail, G, the whole being arranged and operating substantially as and for the purpose herein set forth.

49,669.—Automatic Rake for Harvesters.—William N. Whiteley, Jr., Springfield, Ohio:

I claim, First, The plate, W, and lever, Z, or an equivalent device, for raising the rake away from the platform without affecting the weight of the wings of the reel to prevent the removal of the gavel when desired.

Second, The combination and arrangement of the reel shaft, I, plate, W, flanges, K K, and cam rail, S, for the purpose of revolving, guiding and controlling the action of the combined rake and reel, substantially as set forth and described.

Third, In combination with the staves of an upright revolving reel, substantially as described, the spring, U, or its equivalent, to hold said staves in contact with the cam rail or guide without causing said contact to be rigid and inflexible, substantially as described.

Fourth, Connecting and sustaining the rake and reel upon the platform, A, by means of the arm, C, and the braces, E F and H, substantially as described.

Fifth, In combination with the rake staff, M, the pendant rod, V, substantially as and for the purpose set forth.

Sixth, In combination with the pulley, X, the guide pulley, a, and pin, b, for the purpose set forth.

49,670.—Try Square.—John Williams, Shelburne. Mass.:

I claim the mode of attaching the tongue, B, to the beam, A, by means of the rod, g, and nut, a, arranged and combined in the manner set forth.

49,671.—Stopper for Bottles.—George R. Willmot, Meriden, Conn.:

I claim, First, Attaching the tube, e, to, or forming it in, the same piece with the collar or washer, d, substantially as and for the purpose herein specified.

Second, The stop, f, applied in combination with the screw, B, and nut, c, of the stopper, substantially as and for the purpose herein specified.

Third, Making the upper and lower parts of the elastic plug, A, of the stopper of two different degrees of hardness, substantially as and for the purpose herein specified.

Fourth, Coating the exterior of the plug with flock, substantially as and for the purpose herein specified.

49,672.—Washing Machine.—J. B. Winchell, Chicago, Ill.:

I claim, First, The combination of a reciprocating rubbing board, E, and washboard, D, with a wash box, which has two apartments, C C, separated by a division board, b, substantially as described.

Second, The arrangement of the hinged washboard, D, over the apartment, C', in combination with the apartment, C, substantially as described.

Third, The combination of a hinged wash board, D, and reciprocating rubbing board, E, with the two apartments, C C, substantially as described.

Fourth, The construction of oblong bearing blocks, e e, with rubber or metallic springs, h h, and movable pivot connections, i i, for the arms of the rubbing board, E, substantially as described.

Fifth, The inclined board, D', in combination with the hinged washboard, D, substantially as described.

49,673.—Horse Rake.—Tobias Wilmer, Williamsburg, N. Y.:

I claim, First, The pivoted inclined teeth, A A, in combination with the carrying beam, B, the wheels, C C1 C2, and arm or tongue, D, all constructed and arranged in the manner and for the purposes specified.

Second, In combination with the above, I further claim the inclined concave, E, arranged and employed substantially in the manner and for the purpose explained.

49,674.—Securing Buttons to Cards.—Edward S. Boynton (assignor to the French Self-fastening Button Company), New York City:

I claim the use of a looped or coiled wire, for the purpose of securing buttons to trade sales or show cards, substantially as hereinbefore set forth.

49,675.—Inclinometer.—Aaron Chase (assignor to himself and Timothy How), Somerville, Mass.:

I claim the improved anglemeter or inclinometer, made substantially as described, viz., of the three bars, A B C, and the arc, D, arranged and applied together, and provided with levels and sights, as specified.

49,676.—Car Coupling.—John G. W. Coolidge (assignor to Edwin S. Hovey), Portland, Me.:

I claim a new and improved mode of connecting and disconnecting railroad cars, called a car shackle, in manner and form as is set forth in these my specifications.

49,677.—Table.—Charles Cuttica (assignor to Henry C. Glinsmann), New York City:

I claim parallel moving sections capable of forming a table or a series of shelves, substantially as specified.

49,678.—Capstone for Working Beater Hay Presses.—Peter K. Dederick (assignor to Levi and Peter K. Dederick), Albany, N. Y.:

First, I claim the arrangement of the loose pulley wheel, H, with the belt or strap, T, surrounding it, in the manner and for the purpose specified.

Second, I claim the locking bar, W, passing through the rim of the wheel, H, and operating in connection with the notch, a, in strap or band, T, in the manner and for the purpose substantially as described.

Third, I claim the combination of the incline plane, X, the notched strap, the locking bar, L, arranged as and for the purpose specified.

Fourth, I claim the bolt, L, arranged so as to lock the lever, l, alternately to the pulley, H, and the clutch pulley, J, and disconnect either or both by moving the hand lever.

49,679.—Machine for Cleaning Carding Cylinders.—Alfred A. Hawley (assignor to himself and Robert P. Hawley), Methuen, Mass.:

I claim the machine constructed substantially in manner and so as to operate as hereinbefore described.

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49,680.—Kerosene Lamp Burner.—A. B. Hendryx (assignor to himself, H. A. Shipman and Robert Hoadley), Derby, Conn.:

First, I claim the combination of the tongues, F F, with the tube, A, substantially as and for the purpose specified.

Second, I claim a dome, constructed in the manner and for the purpose specified, when combined with the tube of burners.

49,681.—Device for Tethering Animals.—Warren Johnson (assignor to himself and Albert Thompson), Fisherville, N. H.:

I claim the improvement described, it consisting of the rotary swivel or arm, T, the stationary cap or post, A, and the set screw, S, or equivalent means of fastening the post to the supporting bar, the pole being applied to the said arm, and the whole being arranged in manner and so as to operate substantially as hereinbefore specified.

49,682.—Manufacture of the Salts of Chromium.—B. Margulies, Trieste, Empire of Austria, assignor to Jesse and James W. Tyson, Baltimore, Md. Patented in England, Sept. 6, 1864:

I claim the herein-described process for the manufacture of the salts of chromium

49,683.—Iron for Strap Joints.—William D. Rinehart (assignor to himself, David Z. Brickall and William W. Martin), Pittsburgh, Pa.:

I claim a new article of manufacture, to wit: Iron for strap joints, consisting of strap, gibs and key, said iron being rolled in the form herein described and represented, and for the purpose set forth.

49,684.—Washing Machine and Wringer.—Nathaniel B. Webber, Paoli, Ind., assignor to himself and Thos. B. Jackson, Orange Co., Ind.:

I claim the slides, H, cleets, I, chains, M, pulleys, L, and roller, P, when arranged and combined as herein described, and for the purpose set forth.

49,685.—Mode of Diminishing Friction.—Charles Badin, Paris, France:

I claim, First, The combination of the collar, H, on the axle, with the movable plate, B, supported by the perforated balls, C C C, revolving upon a fixed plate, A, and held to their places by the arms, D D, all arranged in the manner and for the purposes above described.

Second, I claim the mode of piercing the said balls so that the arms, D D D, shall have only one joint of contact therewith, in the manner and for the purpose above described.

49,686.—Fire Alarm.—Charles Dion, Montreal, Canada:

I claim, First, The adjustable segmental plate, G, bearing the composition spring, H, index, F, and scale, I, in combination with the alarm movement, B constructed and operating substantially as and for the purpose described.

Second, The stop lever, h, tripping lever, K, stop lever, l, trip lever, m, trigger, d, and swinging lever, c, in combination with the index, F, scale, I, and alarm movement. B, constructed and operating substantially as and for the purpose set forth.

Third, The use of a system of tubes, extending from different places or rooms in a house or building to a single central position, in combination with balls which are held in said tubes by stops that are released by the action of the metallic thermometer either when the temperature rises above or sinks below a certain point, substantially as and for the purposes set forth.

49,687.—Die Stock.—Joseph Koberle, Kingdom of Bavaria:

I claim the several parts arranged and employed, as described in these specifications

49,688.—Anchor.—Edward Snell, No. 31 Charing Cross, London, Eng. Patented in England July 22, 1864.

I claim the adaptation to the movable arms of double grip anchors, of four horns, which cause the anchor to lie on the ground in the right position and compel the palms or ends of the arms to enter or penetrate the ground and take hold at once—the dispensing with a stock or sector, great holding power, lightness, facility of stowage, non-liability to foul, and facility of withdrawal from foul ground or obstructions, as herein set forth.

49,689.—Apparatus for the Continuous Distillation of Petroleum, Etc.—John Ives Vaughan, London, Eng. Patented in England Oct. 11, 1864:

I claim, First, The treatment of resins and resinous substances by continued or connected operations, whereby the spirit is distilled from the crude substances, and the residual resin volatilized or distilled into a product which becomes solid at the ordinary temperature of the atmosphere, without packing or cooling the resins between the operations, as hereinbefore substantially set forth and described, or any mere modifications thereof.

Second, The construction, combination, arrangement and method of working of the apparatus, for the continuous distillation of resin and resinous substances, coal, petroleum, bone, oil, paraffine, and other analagous acids and hydro carbons, as hereinbefore substantially set forth and described, or any mere modifications thereof.

REISSUES.

2,057.—Steam Boiler Furnace.—Johnathan Amory, West Roxbury, Mass. Patented April 19, 1859:

I claim the method of increasing the combustion and protecting combustion curves, substantially as described.

2,058.—Steam Boiler Furnace.—Johnathan Amory, West Roxbury, Mass. Patented April 19, 1859:

I claim, First, Admitting into the fire-box or chamber of furnaces heat generators, so as to impinge upon and mix with the flame or products of combustion of atmospheric air, by means of, and in combination with, conduits or receptacles, so arranged within, or in relation to, said furnace or heat generator, as to heat the air to the proper degree of temperature during its passage to the said fire-box or chamber, in the manner and for the purposes hereinbefore set forth.

Second, The herein-described method of generating heat; that is to say, forming gaseous fuel by burning coal or other solid fuel, as described, and conveying such gaseous fuel to a separate chamber, there to be consumed by combining with heated air, as set forth.

Third, The combination of a fire-chamber of ordinary or suitable construction for burning solid fuel and for producing combustible gases, with a combustion chamber in which said combustible gases are mixed with air and burned, in the manner hereinbefore described.

2,059.—Broom.—C. L. W. Baker, Hartford, Conn. Patented June 11, 1861:

I claim an improved article of manufacture consisting of a broom, being composed of the fiber of broom corn set in tufts in a block of wood, substantially in the manner as and for the purpose described.

2,060.—Steam Engine.—Edward D. Barrett and H. B. Bigelow, New Haven, Conn., assignees of E. D. Barrett. Patented Jan. 19, 1865:

First, We claim imparting to the valve of the auxiliary cylinder a positive movement from the piston of the principal cylinder by means of the tappet, G, and rocker, F, for the purpose of admitting and exhausting steam to actuate the pistons of the auxiliary cylinder, when the said pistons are constructed of equal areas, and arranged substantially as described, and the steam which actuates them received direct from the boiler, for the purposes of operating the valve or valves of the principal cylinder, substantially as and for the purpose set forth herein.

Second, The pistons, P' and P², constructed and arranged relatively to the passages, d d'. so as to operate in the manner and for the purpose substantially as set forth.

Third, The arrangement of the check valves, I I', and passages, E and E', in relation to the passages, D and D', and the main valve, substantially as set forth.

2,061.—Propeller Wheel.—R. E. Campbell, New York City, assignee of Thomas Tripp, Buffalo, N. Y. Patented Nov. 22, 1859:

I claim a propeller wheel having blades formed in respect to their main propelling surfaces, and in respect to their outward areas, substantially as herein described.

2,062.—Gates for Water Wheels.—Atlas L. Stout, William M. Mills and John Temple, Dayton, Ohio (assignees by mesne assignments of Elijah Roberts, deceased). Patented April 4, 1854:

First, We claim the combination of a ring and rods, with suitable mechanism, for simultaneously and uniformly opening a series of gates of submerged center vent water wheels, at a single operation, above the water line, whereby the water admitted to the wheel may be easily regulated, substantially as described.

Second, Connecting rods with the gates so that the former may freely slide through the latter in the manner described, to permit the gate to be closed by hydrostatic pressure, for the purpose specified.

PATENTS

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FOR SEVENTEEN YEARS.

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MESSRS. MUNN & CO.:—I take pleasure in stating that, while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the office, a marked degree of promptness, skill, and fidelity to the interests of your employers. Yours very truly,

CHAS. MASON.

[See Judge Holt's letter on another page.]

Hon. Wm. D. Bishop, late Member of Congress from Connecticut, succeeded Mr. Holt as Commissioner of Patents. Upon resigning the office he wrote to us as follows:

MESSRS. MUNN & CO.:—It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency; and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy Very respectfully, your obedient servant,

WM. D BISHOP.

THE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a written reply, corresponding with the facts, is promptly sent, free of charge. Address MUNN & CO., No. 37 Park Row, New York.

PRELIMINARY EXAMINATIONS AT THE PATENT OFFICE.

The service which Messrs. MUNN & CO. render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there; but is an opinion based upon what knowledge they may acquire of a similar invention from the records in their Home Office. But for a fee of $5 accompanied with a model, or drawing and description, they have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through the Branch Office of Messrs. MUNN & CO., corner of F and Seventh streets, Washington, by experienced and competent persons. Many thousands of such examinations have been made through this office, and it is a very wise course for every inventor to pursue. Address MUNN & CO., No 37 Park Row, New York.

The Patent Laws, enacted by Congress on the 2d of March, 1861 are now in full force and prove to be of great benefit to all parties who are concerned in new inventions.

The law abolishes discrimination in fees required of foreigners, excepting natives of such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners, except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms. Foreigners cannot secure their inventions by filing a caveat; to citizens only is this privilege accorded.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention the Government fee for a caveat is $10. A pamphlet of advice regarding applications for patents and caveats is furnished gratis, on application by mail. Address MUNN & CO., No. 37 Park Row, New York.

INVITATION TO INVENTORS.

Inventors who come to New York should not fail to pay a visit to the extensive offices of MUNN & CO. They will find a large collection of models (several hundred) of various inventions, which will afford them much interest. The whole establishment is one of great interest to inventors, and is undoubtedly the most spacious and best arranged in the world.

UNCLAIMED MODELS.

Parties sending models to this office on which they decide not to apply for Letters Patent and which they wish preserved, will please to order them returned as early as possible. We cannot engage to retain models more than one year after their receipt, owing to their vast accumulation, and our lack of storage room. Parties, therefore, who wish to preserve their models should order them returned within one year after sending them to us, to insure their obtaining them. In case an application has been made for a patent the model, is in deposit at the Patent office, and cannot be withdrawn.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with patent property or inventions to call at our extensive offices, No. 37 Park Row, New York, where any questions regarding the rights of Patentees, will be cheerfully answered.

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Messrs. MUNN & CO., are very extensively engaged in the preparation and securing of patents in the various European countries. For the transaction of this business they have offices at Nos. 66 Chancery lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. They think they can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through their agency.

Inventors will do well to bear in mind that the English law does not limit the issue of patents to inventors. Any one can take out a patent there.

Pamphlets of information concerning the proper course to be pursued in obtaining patents in foreign countries through MUNN & CO.'S Agency, the requirements of different Government Patent Offices, &c., may be had, gratis, upon application at the principal office, No. 37 Park Row, New York, or any of the branch offices.

SEARCHES OF THE RECORDS.

Having access to all the official records at Washington, pertaining to the sale and transfer of patents, MESSRS. MUNN & CO., are at all times ready to make examinations as to titles, ownership, or assignment of patents. Fees moderate.

ASSIGNMENTS OF PATENTS.

The assignment of patents, and agreements between patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park Row, New York.

HOW TO MAKE AN APPLICATION FOR A PATENT.

Every applicant for a patent must furnish a model of his invention is susceptible of one; or, if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the Government fees, by express. The express charge should be pre-paid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by a draft on New York, payable to the order of Messrs. MUNN & CO. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is out little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park Row New York.

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Messrs. MUNN & CO. are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of their Washington Agency to the Patent Office affords them rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Their success in the prosecution of rejected cases has been very great. The principal portion of their charge is generally left dependent upon the final result.

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MUNN & CO. wish it to be distinctly understood that they do not speculate or traffic in patents, under any circumstances; but that they devote their whole time and energies to the interests of their clients.

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On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
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On application for Re-issue	$30
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EXTENSION OF PATENTS.

Many valuable patents are annually expiring which might readily be extended, and if extended, might prove the source of wealth to their fortunate possessors. Messrs. MUNN & CO. are persuaded that very many patents are suffered to expire without any effort of extension, owing to want of proper information on the part of the patentees, their relatives or assigns, as to the law and the mode of procedure in order to obtain a renewed grant. Some of the most valuable grants now existing are *extended patents*. Patentees, or, if deceased their heirs, may apply for the extension of patents, but should give ninety days' notice of their intention.

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TO OUR READERS.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and enclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

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Notes and Queries

A. F. K., of Cal.—On page 277, Vol. XI., we published a description of an ice-making machine in practical use in England. The plan was to compress atmospheric air by means of a steam engine, and then allow it to expand in contact with water—the expansion absorbing so much heat as to freeze the water. It was claimed to produce a tun of ice by the combustion of a tun of coal. We have also given an account of an ice-making machine in practical operation in New Orleans.

W. J. V., of N. Y.—The *vis viva*, or force of a moving body, is in proportion to the square of its velocity, and the power required to impart velocity is in the same ratio. It, therefore, requires an expenditure of four times the force to impart double velocity either to a projectile or to a revolving wheel.

A. E., of Mo.—In relation to the wagon, the upper and lower parts of a wagon wheel move alike; but in relation to the earth, the upper part is always moving the faster, the point in contact with the earth being the fulcrum on which the rest of the wheel is turning.

R. V. B., of Troy, N. Y.—Mercury does not rise in a capillary tube to the level of the metal contained in the basin in which the tube is placed, because it does not moisten the sides of the tube, having no adhesion to the glass; but as it possesses great adhesion or cohesion to the mercury in the reservoir, and since the narrow column in the tube is, on its side, cut off by the glass from the support of the surrounding liquid, it follows that cohesion is only in one direction, i. e. downward. Hence the depression of the column of mercury.

A. M. F., of N. Y.—The electrical phenomena of the atmosphere are very various and irregular. Several times, on lowering an electroscope, even in high altitudes, the leaves have been seen to expand with negative electricity, and this may be the general law.

S. P. H.—Charles Goodyear's patent has expired.

F. L., of Pa.—The specimen which you send may be called ocher, though of a worthless quality. Ocher is sequioxide of iron mixed with a little clay, and usually some carbonate of lime. This specimen has too much clay in proportion to the oxide of iron.

A. J., of N. Y.—Emery is fastened to wood, in making scythe rifles, by glue. Mica is the most insoluble of substances; it is very slowly dissolved to a small extent by water containing carbonic acid.

J. W., of Va.—The best work that we know of on electro plating is "Smee's Electro-metallurgy."

W. I. L., of N. Y.—When one side and an angle of a right-angled triangle are given it makes two angles, and the triangle is easily constructed. To suppose that with one side and one angle only of an "oblique-angled triangle" you can compute the other dimensions, is absurd.

H. C., of N. Y.—Windmills have been used quite extensively on Long Island, and in other parts of the country for grinding grain, but the great loss of time in waiting for the wind has caused them to be generally superseded by water or steam.

Subscribers, of Mass.—Paris green spread on very small bits of bread and butter is an effectual poison for cock roaches.

RATES OF ADVERTISING.

TWENTY-FIVE CENTS per line for each and every insertion, payable in advance. To enable all to understand how to calculate the amount they must send when they wish advertisements published we will explain that eight words average one line. Engravings will not be admitted into our advertising columns, and, as heretofore, the publishers reserve to themselves the right to reject any advertisement they may deem objectionable.

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How a Wrecked Steamer was Rebuilt.

The Boston and New Orleans Steamship Company recently purchased the wreck of the *Caledonia*, which went ashore on Cape Cod—having cargo in both ends, and empty coal-bunks in the center, she parted and filled with water in the middle compartments. The other compartments, however, were secure, and much of her cargo was removed after she broke. In this condition she was purchased in February, 1863, by three gentlemen. Many difficulties were experienced in the endeavor to get her afloat, and it was not until the following October, and after it had been discovered that she must be plated over the break in the bent state in which she lay, that, during a severe storm that set the sand bank surrounding her in motion, she moved out toward deep water. A year of delay followed, awaiting the construction of Simpson's Dock, the only one large enough to receive her. There she was straightened and about fifty feet cut from the center, with the exception of the iron keel, which had only been bent. The space was then built up and plated in harmony with the original lines. After this she became the property of the company.

A Hoop-skirt Manufactory.

Arms, Bardwell & Co. have a large hoop-skirt manfactory in operation at Northampton, Mass., and the processes through which this article of ladies' wearing apparel passes are quite numerous. The tape is woven and prepared here (a novelty in this country), the raised threads or grooves for the steel being made by a very ingenious chain action. The bands or tapes are then fitted on wooden frames, in various sizes, and sewed. They are ribbed and glued with great dexterity, by hand; the clasping is also done by hand; at first with pincers and then firmly fixed by machine, which, in connection with the glueing process, gives a very strong skirt. Hoops of all sizes, as ordered, are made, ranging from 90 to 120 inches around the bottom. The very best steel is used for hoops, and they are so surely joined as not to break apart. The skirt hoops are so secured under the kid pads, as not to wear through, and stamped with the name of the party ordering. Messrs. Arms, Bardwell & Co. also manufacture pocketbooks and ladies' traveling bags.

"Drulep" and His Umbrella.

The *Gazette de France* devotes two of its columns to the new and startling discovery of an umbrella, the cover of which, instead of being of the texture of Robinson Crusoe's, or of alpaca, or silk, is of the last material any one would guess, namely, rain itself. It says any one who, like myself—the correspondent of the *Gazette*—was passing, between two and three o'clock on the road between Sourdes and Perouse, must have noticed a person who, although unknown in the country, attracted universal attention. The rain was pouring down in torrents. He held a cane about 10 in. above his head. The rain falling on this magic wand, spread out in the form of an umbrella, under which M. Drulep, the inventor, walked perfectly sheltered from even a single drop of water. M. Drulep will not as yet solve this mysterious problem; but the marvelous effect produced by this stick is reported to be due to a new application of electricity, and that M. Drulep's stick acts on the principle of the well-known *tourniquet electrique*.

RICE & EVERED'S TUBE SHEET CUTTER.

This tool is intended to bore the holes for flues or tubes, in the tube plates of locomotive or tubular boilers. It is designed to do extra good work, and is especially valuable where the tubes are close together, since, in plates that have a hole punched or drilled in them to guide the end of the old tool commonly used, there is great danger of the drill running out, or the holes being badly punched by careless persons. With this tool the work must always be first-class. The hole will be true with the center, and, if the marker lays the sheet off properly, the tube plate will be a fac-simile of the draughtsman's projection in the drawing room.

In detail, this tool is simply a steel shank, A, with a sleeve, B. This sleeve slides, but does not turn on the spindle, being held by the feather, C. There is a thread on the sleeve which fits the hollow shank of the hand wheel, D; when the wheel is turned, therefore, the sleeve is drawn up or down.

The lowest end of the sleeve is formed into a socket, E, in which the cutters, F, are held, and there is a center, G, in the spindle, which works in the center punch mark in the work. The hand wheel rests on a collar, H, and is kept from rising by a nut, I, with a left-handed thread. There is a bracket, J, on the table which supports the sheet to be drilled. These are the details.

The inventors and manufacturers say:—

"The object of this tool is to save time in drilling tube sheets, by not having to drill the center hole, which is now either drilled or punched previously to cutting out the full-sized hole, thus saving one handling of the plates. There is also a saving of scrap iron, as thinner cutters can be used, and the center hole is not cut out, but all left in a solid piece. This

Fig. 1

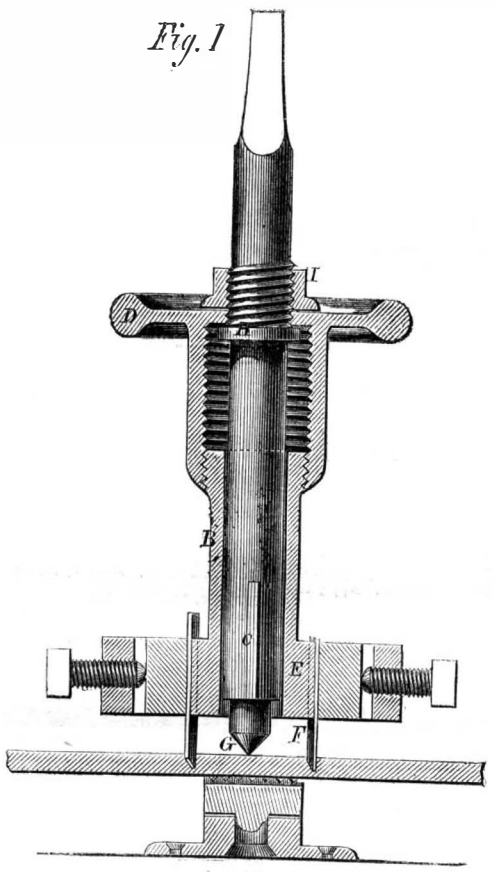

Fig. 2

is no small item where much of this work is done; the difference in scrap iron would soon pay for the tool. It also takes less power to cut than with thick cutters. Another important item is the saving of cutters; these cutters are not half so liable to be broken as those in common use. The reason that these cutters are not so liable to break is, that there is no slack motion to the cutters; they cannot go through or draw themselves into the sheet any faster than the natural feed. All the holes must be, with this tool, cut exactly true with the center punch mark; there is no chance for the drill to run; and where holes are drilled pretty close together, this is also a very important object—locomotive builders, especially, would find this a great help to them in doing good work. It is necessary to have a good solid drilling machine, in using this tool, in order to give the best results. We have used this tool for nearly a year, and are better satisfied with it every day, and have often cut at the rate of 600 holes two inches diameter in five-sixteenths iron, per day of ten hours. The patent for whole States is for sale. We can also manufacture the tools for sale, and have some on hand."

This invention was patented through the Scientific American Patent Agency on May 30, 1865, by D. E. Rice and William Evered, of Detroit, Mich.; for further information address them as above.

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